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THE IMPACT OF THE TORREY CANYON DISASTER ON TECHNOLOGY
AND NATIONAL AND INTERNATIONAL EFFORTS TO DEAL
WITH SUPERTANKER GENERATED OIL POLLUTION:
AN IMPETUS FOR CHANGE?

By

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B.A., University of Montana, 1971

Presented in partial fulfillment of
the requirements for the degree of

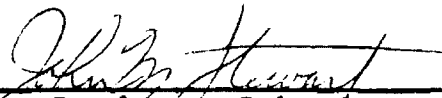
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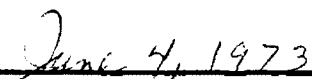
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CHAPTER I

THE EVOLUTION OF INTERNATIONAL SEA LAW

Introduction and Scope of the Treatise

Roll on, thou deep and dark blue ocean, roll!
Ten thousand fleets sweep over thee in vain;
Man marks the earth with ruin-his control
Stops with the shore.

-Byron

International law, of which sea law is a part, is a body of principles, customs, and rules recognized as effectively binding obligations by sovereign states and other international persons in their mutual relations.

Since men first took to the sea in ships the concept of "freedom of the seas" has meant different things to different people. The phrase has proved ambiguous, unclear, and indeterminate. Powerful nations have often championed the phrase in their ideology, while ignoring it in practice. The primary problem faced by men and states has concerned the exercise of jurisdiction over the seas. There has been a vital difference between the jurisdiction that states claim over the water contiguous to their land borders and the jurisdiction they assert over the high seas.

International sea law is an important part of the existing body of international law. The seas are used as

vehicles of movement, communication, and trade, as well as for the exploitation of resources. Almost all nations have sought to use the oceans for some purpose throughout history. To achieve their goals states have often made opposing claims in attempting to obtain authority. The strategies employed range between persuasion and coercion, and have included diplomatic, ideological, economic, and military methods. However, the vastness of the oceans has also caused the development of many cooperative ventures. There is now a trend aimed at the inclusive rather than the exclusive use of the world's seas. As a result, a degree of integration has occurred which has increased the use and enjoyment of the oceans. One of the great problems has been that decisions relating to the oceans have too often been unorganized and decentralized due to the absence of effective supranational police power.¹

Custom is probably the most important source of international sea law, and the great powers have greatly shaped its development. Chief Justice John Marshall of the United States Supreme Court declared in an 1833 decision that usage by nations becomes law, and established rules may be considered rules of law.²

¹William Burke and Myres McDougal, The Public Order of the Oceans (New Haven and London: Yale University Press, 1962), pp. i-x.

²John Colombos, The International Law of the Sea (London: Longman's Inc., 1961), p. 7.

Other important sources of international sea law include: treaties made between states which establish rules that the signing parties accept, judicial decisions of municipal and international courts, national statutes, the writings of jurists, and equity.

The international law of the sea has been in perpetual movement. In the twentieth century new ships, expanded trade, travel and communication, use of the seas and their resources, and national and international pollution of the world's oceans have necessitated the evolution of the law of the sea.

This treatise is devoted to a contemporary international problem of the seas. The paper analyzes the environmental and legal problem of supertankers polluting the seas of the earth by accidental and casual crude oil pollution. Specifically, it deals with the Torrey Canyon catastrophe and its consequences on the existing sailing practices of supertankers, as well as with national and international sea law. In discussing this catastrophe it is necessary to analyze the environmental effects of oil on the sea, and the efforts to disperse oil spills. The material is organized to acquaint the reader with the historical evolution of rules governing the use of the seas, the current environmental problems and technological challenges presented by supertanker-caused oil pollution, and modern

national and international efforts to deal legally with such oil pollution. The paper is structured around a case study of the 1967 Torrey Canyon disaster which occurred off the coast of England. This wreck had a profound effect on existing national and international law, and revealed the glaring inadequacies of present technology for dealing with large scale oil pollution.

The first chapter reveals that rules governing the high seas originated in early times. In order to understand contemporary problems of the seas, such as the national and international pollution of the seas, it is helpful to understand the evolution of sea law. Over a period of years a schism developed over the control of the seas. Nation-states claimed sovereignty over certain areas, while the remaining oceanic waters were held in common ownership by the states of the world. Many attempts to control the seas have been made through the exercise of power, the consequences of war, and the work of international conferences, courts, and treaties. The development of international sea law has been incremental rather than sudden. When faced with sudden catastrophes, such as war, international sea law has proven inadequate. The modern crisis of oceanic pollution now facing the world's seas has forced states and international bodies to deal with a new jurisdictional problem which is immediate rather than evolutionary in nature. Because the

Torrey Canyon wrecked in international waters, but polluted the territorial waters of France and Britain, it is important to understand the distinction that exists in international law between the high seas and the territorial sea of the nation-state. A great deal of the modern sea law in existence at the time of the wreck was produced by the Law of the Sea Conferences. These conferences are also discussed.

The second section of this study deals with oceanic pollution, oil, and supertankers. It reveals that oil pollution from ships is the most chronic of the man-caused pollution problems confronting the oceans. Following World War II pollution by oil increased as the volume of supertanker traffic increased. Today's supertanker is a technologically modern ship which still results in a great amount of oil pollution. This chapter demonstrates that the technology developed by man for the transportation of oil by supertankers has outstripped his political ability to control the movement and discharge of oil from these vessels. The consequences of oil on and in the marine environment have only recently been understood by scientists. The effects of oil on marine life, as well as the technological methods developed to deal with this oil are surveyed in order to demonstrate the scope of the problem as well as the efforts employed to deal with it. The problems outlined in this chapter are directly applicable to the events connected with the wreck of the Torrey Canyon.

Often great disasters thrust ills that have long existed into the public consciousness. The scope of the Torrey Canyon wreck in 1967--it was the largest vessel ever wrecked--made it impossible to continue ignoring oil pollution damage to the world's seas and shorelines. The national and international implications of the wreck resulted not from the grounding, but rather from the release of the ship's cargo of crude oil into national and international waters. A case study of the wreck in terms of international law, and the biological, environmental, and political consequences of the wreck are chronicled in the third chapter. The study reveals the inadequacies of traditional law and technology to deal with such disasters. An analysis of the catastrophe demonstrates that many of the problems faced following the wreck were scientific and political in nature. The technological and environmental problems that arose from the grounding and the discharge of the crude oil are examined in light of the material contained in chapter two. It is shown that a great deal of ignorance existed about how oil on the sea should be dispersed, as well as what existing international law governed such incidents.

The final chapter deals with national and international legal efforts to deal with pollution. In modern times nation-states have an obligation not to pollute the oceans of the world. Until recent times they have usually been guided by

general principles of justice, rather than conventional law. In most cases it has fallen to each state to enforce national and international statutes against their flag ships.

The Early Development of Sea Law

Prior to the establishment of the empires of classical Greece and Rome, many early people recognized that dominion over the seas was possible. They were inclined to believe that it was possible to obtain a dominion over the seas comparable to that on land. It is important to remember that any control over the sea by the ancients was de facto physical control rather than de jure acceptance of law. De jure rules of control were impossible during early history because interstate law had not yet developed.³

From the fall of Rome until about 1600 many countries specifically claimed dominion over various oceanic areas. The concept of "freedom of the seas" completely vanished in the Mediterranean. Spain included in the list of regions she ruled del Mar Oceano, which means areas "of the oceans."⁴

From the sixteenth century on jurists were deeply concerned with the issue of whether states could legally claim dominion over the sea. State practice seemed to indicate that states could claim dominion over parts of the sea. Use of the sea was based on national title to the water in

³Pittman Potter, The Freedom of the Seas in History, Law, and Politics (London: Longman's Inc., 1929), pp. 11-15.

⁴Colombos, pp. 33-34.

question. From this basis the right to board and search vessels was slowly embodied in the law of the sea. States soon began the practice of embargoing or arresting vessels during wartime, and often using them for their own war efforts. Finally, the pirate provided an excuse to expand maritime dominion. Nations began dealing with pirate ships regardless of their nationality.⁵

The fight between the advocates of dominion over the sea, and those who favored freedom of the seas, reached a climax in the "battle of the books" which occurred between the Dutch jurist Hugo Grotius, and the Englishman John Selden. Hugo Grotius's 1609 classic work on the status of the sea, Mare Liberum, called for freedom of the seas. He utilized the writings of Roman scholars and jurists to support his arguments. John Selden's work on the sea, Mare Clausum, appeared in 1635 and called for dominion over the seas. Both works articulate sound arguments based on national viewpoints and personal bias. It wasn't until a later period that the views of Grotius came to be accepted over Selden's.

Cornelius Van Bynkershoek helped formulate a solution to the controversy raging over the oceans. In his 1703 book, De Dominio Maris, he states that the dominion of a nation over its adjacent sea should extend to the furthest range of cannon shot. Later, the Italian scholar Galiani suggested this to be about three miles. Although states

⁵Potter, pp. 43-50.

have varied in their de facto control over the seas, the major problem has been defining jurisdiction rather than dominion.

The United States was the first nation to set forth Galiani's principle in a state paper. On November 8, 1793, Thomas Jefferson, then Secretary of State, stated in a letter to the British and French Ministers that the smallest distance claimed by a nation for jurisdiction of the seas was "the utmost range of cannon ball," which he stated was "about one league" (three geological miles). During this period the U. S. had been embarrassed by the operation of foreign privateers in the seas directly off the U. S. coast.

Although the origin of the three mile limit has been attributed to Bynkershoek's "cannonshot rule," it has been shown that the cannons in existence at this time could not reach three miles. Actually, Bynkershoek said that "the territorial sovereignty ends where power of arms ends."⁶

Earlier claims over wide sea areas ended by the realization that demands could not be asserted beyond a point where the power of a claimant to control an area ends.⁷ Although some states soon had the power to control areas further out to sea than three miles, economic and political

⁶Arthur H. Dean, "The Second Conference on the Law of the Sea," American Journal of International Law, LIV, 4 (October, 1960), p. 759.

⁷Ibid., p. 761.

reasons militated against great extensions of this limit. States came to realize that freedom of the high seas was in the interest of all trading nations. The evolution of international law recognized this usage.⁸

From the time of Bynkershoek, states began acquiring increasing rights over their territorial sea and by the eighteenth century sea law was becoming allied with state practice. Writings, state practice, diplomatic correspondence, treaties, and judicial decisions dealing with sea law accumulated, and solutions to the problems of sea law were reached, reversed, and reiterated.

Warfare has always posed a problem for international law. The actions of nations at war have invalidated many international rules of war at sea. However, it must be recognized that many of the laws relating to the use of the sea during peacetime have been adhered to during war. States that violated the existing law generally either denied that they had broken the law, or tried to justify their actions. Wars have served to reveal the extent of disagreement among nations as to what the extent of international sea law should be during wartime. Principles written into covenants dealing with war have often not been accepted as binding by many states in their application.

World War I served as a landmark in international law

⁸Ibid.

at sea. This war caused the world to realize that there are two sets of sea law--one for peacetime, and one governing wartime. When states accept war they establish conditions which facilitate their war interests while militating against the interests of other nations. It is impossible to draw a line between "maritime regulation in time of peace, and maritime regulation in time of war."⁹

Essentially there can be no freedom of the seas in time of war. All belligerent rights at sea deny full freedom of the seas. Besides causing infringements on belligerents, war also causes infringements on neutrals. Although in earlier years complex regulations were drawn up regulating warfare at sea, the only general rule that holds is that which insists on safety for the lives and property of neutrals. This principle has been subject to redefinition with each case. Generally a rule of war may be broken if the breaker judges it is essential that it be abrogated to obtain a desirable end.¹⁰

Following World War I President Woodrow Wilson believed that a League of Nations could provide the world with the machinery necessary to maintain the peace. He felt the League could define sea rights and by authorizing their enforcement liquidate national maritime domination. In

⁹Charles Davison, The Freedom of the Seas (New York: Moffat Yard and Co., 1918), pp. 33-46.

¹⁰Ibid., pp. 19-25.

the second of his famous Fourteen Points Wilson advocated absolute freedom of navigation upon the high seas, in peace and in war, with the exception that the seas could be closed, in whole or in part, by international action for the enforcement of international covenants. The League also set up a Permanent Court of International Justice to adjudicate disputes between member states and to offer legal opinions to the Council of the League. The League attempted to codify several issues of maritime law.

A clause in Article 23 of the Covenant stated that subject to and in accordance with the provisions of international conventions existing or hereafter to be agreed upon, the members of the League will make provision to secure and maintain freedom of communications and of transit and equitable treatment for the commerce of all members of the League.¹¹

A League of Nations committee completed a draft on international sea law in 1926. It accepted the three mile limit measured from the low water mark and agreed that nations should have a degree of control over a contiguous zone outside of this area. Within its territorial waters the riparian state was to have full powers of legislation and administration, subject to any restriction imposed by the draft convention. The denial of the use of tolls within territorial seas was excluded, but the idea of hot pursuit was embodied. The industrial states were also to be given the right to use the sea floor for their own purposes.

¹¹Colombos, p. 21.

In 1924 a Brussels meeting drafted and adopted a convention dealing with ship owner's liability. The resulting convention limited owner's liability to the value, freight, and accessories of a ship, except in exceptional circumstances.

By the 1920's nations were also beginning to worry about the problems associated with oil pollution at sea by ships. In 1926 a Preliminary Conference of Experts met in Washington and developed a draft convention which called for ships to take all possible action to prevent oil pollution. At a related 1929 London meeting the International Convention for the Safety of Life at Sea was signed. It dealt with such topics as navigational safety and ships' construction.

The Development of International Sea Law Following World War II

In 1945 the United Nations was formed by the signature of fifty nations to the United Nations Charter. This body represented a new effort to outlaw war through the instrument of collective security. Unlike the League of Nations, the new United Nations included all the major states of the world who possessed "real power."

The United Nations established the International Law Commission in 1947. It was to survey international law and make recommendations to the General Assembly. The Commission was established under Article 13 of the Charter which provided

that the General Assembly could "initiate studies for the purpose of encouraging progressive development of international law and its codification."

In 1948, President Truman announced that the United States had plans to set up conservation zones in the contiguous areas of the high seas where fishing might occur. The United States was the first major nation to develop such zones. He also declared the right of jurisdiction and control over the use of natural resources on the continental shelf. This led to other nations making similar claims. Some states extended their territorial sea to two hundred miles, while others claimed sovereignty over the continental shelf and the waters above it.¹²

Truman's proclamation was followed in 1953 by Congressional passage of the Submerged Lands Act and the Outer Continental Shelf Lands Act. These acts attempted to define which natural sea resources the United States should control and pushed the extent of the United States jurisdiction to the edge of the continental shelf. Other nations followed the United States example by making similar claims.

As the result of preliminary work done by the International Maritime Committee, a jurisdictional committee, a convention was signed in Brussels on May 10, 1952. It provides that a navigational incident involving a sea-going

¹²Gerhard Von Glahn, Law Among Nations (London: Collier McMillan, 1965), p. 327.

ship, under the authority of a person in service of the ship, shall be handled by the flag ship of the state involved.

This rule does not apply to collisions occurring within the limits of a port or in inland ports. Under this treaty states have the option of assuming jurisdiction for offenses which occur within their own territorial waters. Disputes are to be submitted to arbitration, or to the International Court of Justice.

Another convention signed the same day established that a ship flying the flag of a contracting state may be arrested in the waters of any other contracting state for the purposes of making maritime claims. However, the proper court of jurisdiction of the arresting state has to assume responsibility for the case and the ship has to be released upon the posting of bail.¹³

In 1952 the Minister of Transport of Great Britain appointed the "Faulkner Committee on the Prevention of Pollution of the Sea by Oil" to consider measures to prevent oil pollution of the waters surrounding Britain. The Committee made its report in 1953 and recommended an extensive prohibited maritime zone. It also suggested that because the flag states of most ships have jurisdiction over them, these states should agree to prevent the discharge of oil into the ocean. With regard to tankers, the Committee stated that the

¹³Colombos, p. 268.

main problem was the dispersal of tank washings and oil-contaminated ballast water. Until an international treaty was signed they also suggested that tankers registered in Great Britain comply with strict regulations against discharging oily residues into the sea. For other ships it suggested a system to purify ballast water from its fuel oil tanks.¹⁴

In 1953 Great Britain called into session the London Conference, which in 1954 initiated the International Convention for the Prevention of Pollution of the Sea by Oil.

Twenty nations signed the convention. The treaty forbade the dumping of oil within fifty miles of shore by ships registered by the signatory states. The treaty was amended in 1962. The amendments extended the prohibited zones in some cases and forbade some ships to discharge oil outside of the prohibited zones except in exceptional circumstances.

A diplomatic meeting was held in Brussels in 1957 and increased the limits of liability for ships that had been established under an 1894 act. The conference adopted a convention which established a fixed liability of twenty-four pounds per ton of ship due to damage or wreck and seventy-four pounds per ship's ton for loss of life and personal injury.

¹⁴Ibid., pp. 373-374.

The Law of the Sea Conferences

Resolution 1105 of the General Assembly of the United Nations, passed on February 21, 1957, called for a conference to examine the legal, technical, biological, economic, and political aspects of the sea. This conference was further given the authority to summarize the results of its work by international conventions or similar instrument. The first conference provided the first world-wide meeting held on the sea since the 1930's.

Six sessions of preliminary work by the International Law Commission provided draft articles to be considered at the meeting. Before the conference met most of the world felt that the major problem to be dealt with would concern the legal limit of the territorial sea.

The General Assembly passed a resolution recommending that a preliminary Conference of Land-Locked States be called in Geneva. Such a meeting was convened and recommended that land-locked states enjoy the same free access to the seas, use of flags, and ports as nations bordering on the sea.

The 1958 United Nations Conference on the Law of the Sea met in Geneva from February 28 to April 28, 1958, and was attended by eighty-five nations. Four conventions were passed. They dealt with: 1) the High Seas, 2) Fishing and Conservation of Living Resources of the High Seas,

3) the Continental Shelf, and 4) the Territorial Sea and Contiguous Zone. These four agreements embody large areas of agreement and all are now in force. Because the 1958 Conference failed to reconcile the problem of the breadth of the territorial sea, it ended by calling on the General Assembly to convene another conference sometime in the future to deal with this problem. The Conference made an important contribution toward codifying rules concerning coastal waters, the continental shelf, and the high seas. The four conventions are thorough in theory, but they lack satisfactory methods for enforcement.

Although a Convention on the High Seas was signed in 1958, "only a person without a country, navigating an unregistered vessel on the high seas in time of peace, and never putting into port, could enjoy anything like an absolute freedom of the sea."¹⁵ Under this agreement the high seas are defined as those waters outside of state control. The ships of all states are generally entitled to use these waters. Article 2 listed four freedoms to be found on the high seas: 1) freedom of navigation, 2) freedom of fishing, 3) freedom to lay submarine cable and pipeline, and 4) freedom to fly over the high seas.¹⁶

¹⁵Philip Jessup, The Law of Territorial Waters and Marine Jurisdiction (New York: G.A. Jennings Co., 1927), p. 149.

¹⁶"Convention on the High Seas," American Journal of International Law, LII, 4 (October, 1958), pp. 842-843.

Article 3 strives to improve the position of states handicapped by geography. It provides that land-locked nations have the right of free transit through the territory of nations located between themselves and the sea, as long as it is done in accord with existing international conventions. Article 11 states that when collisions occur between ships on the high seas exclusive jurisdiction should be given to the flag state, unless the accused person is a national of another state. If this is the case, both states have concurrent jurisdiction. Articles 24 and 25 require states to take measures to prevent oil and radioactive pollution. These articles strengthen the claim of those who claim the sea as public domain, res publica, rather than community domain, res communis.

The basic principles of the Convention on Fishing and Conservation are found in its first article. This article provides that all states have the right for nationals of their country to engage in fishing provided they adhere to treaties already existing, the interest and rights of coastal states, and to other provisions of the treaty. All states have a responsibility to adopt or cooperate with other states in developing measures for their nations necessary for the conservation of the living resources found on the high seas.¹⁷

¹⁷"Convention on Fishing and Conservation of the Living Resources of the High Seas," American Journal of International Law, LII, 4 (October, 1958), p. 852.

This agreement represented a significant step forward as it adopted a comprehensive code regulating the conservation of the natural resources of the sea. It was the first international legislation in this area to contain arbitral procedures.

The continental shelf is the gentle slope from the edge of land down to a point where a sudden increase in steepness takes place to the depths of the oceans. Its width varies from less than one mile to eighty miles, although thirty miles is about average.

The 1958 Convention on the Continental Shelf recognized a state's exclusive rights to the seabed and its resources to a depth of 200 meters, or to the depth of adjacent waters which would permit the exploitation of the resources of the continental shelf. If a coastal state chose not to exploit these resources no other state could do so without the consent of the coastal state.¹⁸

Prior to the convening of the conference the International Law Commission had failed to adopt a provision to alter the existing rule that the maximum width of the territorial sea is three miles. It was suggested that any claim of more than twelve miles could not be defended, but it left the matter up to the conference. At the meeting it

¹⁸"Convention on the Continental Shelf," Ibid., pp. 858-859.

became apparent that no agreement could be reached by the necessary two-thirds vote. The United States proposed that the territorial sea should be extended to six miles with the right of the coastal state to regulate fishing for another six miles beyond this--except where historical fishing rights existed. This proposal failed to receive the necessary majority, although it did receive more votes than any other proposals.¹⁹

The Treaty on the Territorial Sea and Contiguous Zone sets up a method to determine the breadth of the territorial sea. Article 5 provides that the right of innocent passage exists with regard to newly-created internal water, if they had historically been open to such passage.²⁰

Article 16 specifically protected the right of innocent passage of foreign ships through straits used for international navigation, and through straits located between one part of the high seas or the territorial sea of a foreign state. This article is grounded in the Corfu Channel Case of 1946. In this case the World Court ruled that British ships had been illegally fired upon by Albanian shore batteries while in the Strait of Corfu, which runs between the Island of Corfu and the west coasts of Greece and Albania. Where the Strait is six miles or

¹⁹Von Glahn, p. 305.

²⁰"Convention on the Territorial Sea and the Contiguous Zone," Ibid., p. 835.

less in width both Greece and Albania claimed a three-mile territorial limit, but where the width is less than six miles the midline was to be used to measure the territorial sea.²¹

Article 24 states that the contiguous zone could not extend beyond twelve miles from the initiation of the baseline used to measure the territorial sea. This article further provides that coastal states could prevent interference with their customs, fiscal, or sanitary regulations within their territorial sea. Infringement with these functions leaves a vessel open for punishment in the courts of the state within whose waters crimes were committed.

Besides the four conventions passed at this first conference, an optional protocol also was passed. It provides for the compulsory settlement of disputes and provides for jurisdiction of the International Court of Justice in cases not covered by procedures for settlement within the four conventions.²²

Philip Jessup, a noted international law expert, expressed his opinion on the accomplishments of the Geneva Conference. He stated, "Much of the law of the sea which is applied commonly in the courts of many countries today

²¹I.C.J. Reports, 1949, pp. 4 and 244, as cited in Von Glahn, pp. 286-289.

²²"Optional Protocol of Signature Concerning the Compulsory Settlement of Disputes," American Journal of International Law, LII, 4 (October, 1958), pp. 862-864.

is not 'international law.'"²³ Jessup was not surprised that agreement was not reached on all problems, but instead was pleased that agreement was reached on so much.

He felt that the International Law Commission had done a commendable job in submitting draft proposals, and he felt that most of the voting done by the nations attending was not based on opposing blocs. He concluded that if the International Law Commission drafts were followed in the future, further progress could be made along many lines of international law.²⁴

The Second Conference on the Law of the Sea, called for at the conclusion of the 1958 conference, was held in Geneva in 1960 under United Nations auspices. This conference soon bogged down in the conflicting claims states were making about the width of their territorial waters and fishing zones.

Many nations had unilaterally extended their territorial sea, but such claims were given little validity unless accepted by a significant number of nations. Russia proposed that each state be able to select the width of their territorial sea as long as the distance claimed was between three and twelve miles. Beyond this the Soviet Union favored a

²³Philip Jessup, "The Geneva Conference on the Law of the Sea--A Study in International Lawmaking," Ibid., p. 615.

²⁴Ibid., pp. 615-625.

fishing zone that would extend twelve miles beyond the limit of the territorial sea. The United States and Canada were interested in a six mile territorial zone. Compromise was unsuccessfully attempted and the conference ended without reaching an agreement on the proper limit of the territorial sea.²⁵ The failure of the conference to define the limits of the territorial sea leaves great leeway for dangerous disputes to develop among nations.

Recent Developments in International Sea Law

The largest ship ever wrecked, the behemoth super-tanker Torrey Canyon, ran aground Seven Stones Reef off the coast of Cornwall in southern England on March 18, 1967. The wreck and its aftermath sensitized the world to the environmental impact of oil spills. The disaster set off a world wide search for a means to avoid future problems with marine oil pollution. In May, 1967, new, more powerful amendments to the International Convention for the Prevention of the Pollution of the Sea by Oil came into force. This treaty, however, fails to deal with the problem of traffic on the high seas.

Soon after the Torrey Canyon disaster an emergency session of the Intergovernmental Maritime Consultative Organization (IMCO), a United Nations body, convened in London at the request of the Government of Great Britain. The meeting

²⁵Von Glahn, p. 305.

set up several study groups, and discussed two conventions that would be considered at the organization's planned meeting in Brussels in 1968.

When the Brussels meeting took place two conventions were passed. They were a direct outgrowth of the Torrey Canyon disaster, but they have not yet entered into force because an inadequate number of nations have accepted them.

The International Convention Relating to Intervention on the High Seas in Case of Oil Pollution Casualties was signed at Brussels on November 29, 1969. The measure is designed to prevent or lessen the danger of oil pollution on the high seas damaging the coasts of contracting coastlines. The other convention, the International Convention on Civil Liability for Oil Pollution Damage was signed the same day. This treaty applies exclusively to pollution damage caused in the territory of a contracting state, including its territorial sea, and to the preventive measures taken to prevent or minimize damage by such a state.²⁶

In December of 1971 another international convention on oil pollution was signed under the sponsorship of IMCO. This convention sets up an international fund to compensate

²⁶"International Convention Relating to Intervention on the High Seas in Cases of Oil Pollution Casualties," and "International Convention on Civil Liability for Oil Pollution," American Journal of International Law, LXIV, 2 (April, 1970), pp. 471-490.

the victims of oil pollution.²⁷

IMCO is planning to hold a conference in 1973 to prepare an international agreement to place restraints on the contamination of the sea, land, and air, by any equipment operating in the marine environment. Apart from any such agreement states have the right to prohibit ships that do not conform to reasonable standards from entering their territorial sea, contiguous zones, or ports.²⁸

Besides the treaties, several regional groupings of states have initiated covenants to control oil pollution in areas contiguous to their states.

Efforts have also continued to control the military use of the oceans. In 1969 the Soviet Union and the United States made known the provisions of an international convention to ban nuclear weapons from the ocean floor. By the provisions of this treaty both parties agree not to use the sea floor for the implantation of nuclear weapons.²⁹

In recent years many states have claimed sovereignty over areas beyond the traditional three-mile territorial

²⁷"International Convention on the Establishment of an International Fund for Compensation for Oil Pollution Damage," American Journal of International Law, LXVI, 3 (July, 1972), pp. 712-733.

²⁸Oscar Schacter and Daniel Serwer, "Marine Pollution--Problems and Remedies," Ibid., LXV, 1 (January, 1971), pp. 84-95.

²⁹"United Nations: Treaty on Prohibiting the Emplacement of Nuclear Weapons on the Seabed and Ocean Floor," International Legal Materials, X, 1 (January, 1971), pp. 145-152.

limit. A main objective of most of these claims has been control of off-shore resources. Generally the small states have been prone to extend the area of their control. While large states possess the resources to range over the whole area of the oceans, the small states have limited resources and are forced to concentrate on the areas adjacent to their coasts.

In May 1970, a meeting of the law of the sea was held in Montevideo, Uruguay, and was attended by several Latin American States. Out of this meeting a declaration entitled the "Montevideo Declaration on the Law of the Sea" was issued. The signatories all extended their jurisdiction over the sea, and its soil and subsoil, to 200 nautical miles. Parties to the agreement stated that the extension was made to conserve the resources of the sea and its subsoil. The Declaration was made to declare and justify the extension of jurisdiction.³⁰

The seabed is another contemporary area of concern. On December 17, 1970, the General Assembly of the United Nations passed a resolution dealing with the ocean floor. It declared that the seabed, ocean floor, and subsoil of the oceans were beyond national jurisdiction, and that the resources of the seabed should be made the common heritage of mankind. The seabed, the resolution stated, "was not

³⁰"Law of the Sea," American Journal of International Law, LXIV, 5 (October, 1970), pp. 1021-1023.

to be subject to appropriation by states or persons."³¹

The creation of an International Seabed Authority is not foreseen for the near future. The major oceanic powers have world-wide interests and will most likely oppose a jurisdictional zone greater than twelve miles.

Conclusion

In summarizing the evolution of sea law one is struck by its lack of responsiveness. It has been structured to deal with problems that become severe enough to be noticed. War at sea provided the impetus for complex rules to govern warfare, rules that were for the most part conveniently forgotten in wartime situations. In some areas it has failed to deal adequately with longstanding problems. The nation-state system is still grappling with such basic problems as the proper width of the territorial sea. In recent years states have met to try and reach international agreements dealing with liability and oil pollution, while they have continued their attempts to end their national control over the sea for economic and security reasons.

Generally international sea law may be characterized as being unable to be innovative enough to deal with problems that have not yet become chronic. Oceanic oil pollution has become widely identifiable as a problem in the last ten

³¹Wolfgang Friedman, "Selden Redivivus--Towards a Partition of the Seas?", American Journal of International Law, LXV, 5 (October, 1971), pp. 757-758.

years, yet a perusal of international law and its application reveals the inadequacy of the law to deal with such problems. The existing law was totally inadequate to deal with Torrey Canyon type disasters.

Not until the lion and the lamb lie down together will there be freedom of the seas. As long as man exists there will be conflicts over the oceans, and continuing attempts to regulate this conflict must be made. The real question is not shall the sea be regulated, but how and to what extent should it be regulated. To achieve the greatest degree of freedom of the seas it is necessary to impose controls over it.

The next chapter will reveal the difficulties that exist with those who believe that there exists a freedom to pollute the national and international waters of the world, as well as with those who inadvertently pollute the oceans through negligence. The problems relate to the world's need for oil, the growth of the supertanker fleet, the environmental effects of oil on the sea, and the technological methods available for dealing with oil spills. These problems help to explain the significance and consequences of the wreck of the Torrey Canyon.

CHAPTER II

OIL, SUPERTANKERS, AND ECOLOGY

Introduction

The Torrey Canyon was only one of the many oil-carrying behemoths traversing the world's shipping lanes at the time of its grounding. This tanker, as well as her sister ships, were produced because of the developed nations' insatiable demand for oil, oil that is unavailable in sufficient quantities to supply many nations adequately. The oil spill resulting from the wreck represents a chronic source of marine pollution, but only one of a number of other prevalent pollutants threatening the oceans today. Supertankers present many immediate and potential dangers to the seas. Slowly technology is developing methods to make casual oil pollution unnecessary. At the time of the Torrey Canyon wreck politicians and scientists were largely ignorant of the material presented in this chapter relating to the environmental impact of oil spills and the technology available to treat them.

Significantly, most of the source material employed in researching this chapter was written after the wreck of the Torrey Canyon. This accident not only caused an

awakening in the political and legal community, but also shocked the scientific community, and resulted in heightened awareness in the business community. The wreck revealed the problems associated with the transportation of increasing amounts of oil by supertankers. Further, the disaster provided an impetus to scientists and technicians to conduct additional research on improved technological methods for dealing with spills. Biologists and chemists developed new data on the physical and physiological effects of oil pollution on living organisms, as well as studies on the chemical and physical activity of oil after its introduction into the sea.

The Need for Oil

The modern state is a technological state which depends on oil for its basic fuel. The non-Communist world relies on petroleum fuels for 51.6 per cent of its energy. Oil products produced 32.9 per cent of its energy for this block in 1950 and 48.3 per cent of its energy in 1965.¹ Part of this growth can be attributed to a drop in coal production, as well as to delays and high costs encountered in nuclear power production.

The United States is the world's largest oil consumer, using 12.28 million barrels per day, or 34.2 per

¹Earle Gray, Impact of Oil (Toronto, Winnipeg, and Vancouver: Ryerson Press, 1969), p. 120.

cent of the world's daily production. Western Europe is in second place utilizing 9.15 million barrels per day, 20 per cent of the world's daily total. The Sino-Soviet bloc is in third place consuming 5.24 million barrels per day, 14.7 per cent of each day's output.²

America is also the world's leader in producing oil with a daily output of 10.22 million barrels of crude per day, 27.7 per cent of the world's daily output. Western Europe yields only .45 million barrels per day, 1.2 per cent of the daily total. The Sino-Soviet bloc contributes 6.33 million barrels a day, 17.2 per cent of the world's daily production.³

Oil exportation is of economic importance to only a few countries. There are only twelve nations in which oil production exceeds consumption by four or more times. These important exporters include: Venezuela, Iran, Saudi Arabia, Kuwait, Bahrein, Qatar, Abu Dhabi, Algeria, Libya, Iraq, Nigeria, and Gabon.⁴

The technologically sophisticated nations all require more oil than they currently produce. This has forced them to search worldwide to find additional sources. In large part they have turned to the Middle East which is

²Ibid., pp. 120-121.

³Ibid.

⁴Peter R. Odell, Oil and World Power (Harmondsworth, England: Penguin Books, 1970), pp. 65-67.

estimated to hold 59.5 per cent of all the known remaining world oil reserves. In 1967 the Middle East used only 2 per cent of their oil production for their own needs. The excess is sold to the advanced nations who must provide means of transporting their purchases to refineries and markets. It has largely fallen to oil tankers to carry this oil.

By 1975 it is estimated that 76 million barrels of crude oil will be required for daily world energy use. This is double the amount used in 1967 and will create a demand for bigger and better oil tanker transports.⁵ Ideally, the technology used to produce these ships will also develop safe processes for the exploration, transportation, refinement, and use of petroleum products.

The Control of Oil

Oil is the largest business in the world, and probably the only international industry worldwide in scope. The shipping industry that grew up to service this business now contributes more gross tonnage to the world's merchant marine than any other field.

Supertankers have carried more oil as more oil has been produced. In 1950 the production of crude oil was twice what it had been in 1945, by 1960 it had doubled

⁵Julian McCaull, "Black Tide," Environment, X, 9 (November, 1969), p. 2.

again to one-thousand million tons, and three-thousand million tons are expected to be produced by 1974.⁶

A small group of large elite companies control 80 per cent of the oil produced outside of the North American and Communist States. In this area of the world they exercise authority over 70 per cent of the total refining capacity, own or operate under charter 50 per cent of the internationally operating tankers, and control the major pipelines. Five of these companies are headquartered in the United States. The largest is Standard Oil of New Jersey which trades as Esso outside the United States, and under the trademark Humble Oil in the United States. Other Standard companies in the elite group include Standard Oil of New York which trades as Mobiloil, and Standard Oil of California, conducting business under the name Chevron. The American portion of this "elite" is completed with the additions of Gulf Oil, headquartered in Pittsburg, and Texaco, with home offices in Texas. The foreign members consist of Royal Dutch/Shell, and British Petroleum.⁷

Before World War II these giants formed a cartel that was eliminated by the effects of the war, coupled with United States anti-trust legislation. Private independent companies own 18 per cent of the world business,

⁶Ode11, p. 11.

⁷Ibid., pp. 12-15.

the government-owned agencies control 12 per cent of the industry.

The Control of Oil Tankers

Although oil companies own only about one-third of the world oil tanker fleet, they control a good deal more of it through long and short term charter contracts. Many tankers are owned by front companies set up in Liberia, Panama, Honduras, and other countries. Generally these states offer low taxes and relatively lenient maritime regulations.⁸

A further incentive is provided to operate ships under foreign flags because the earnings of American-owned foreign corporations can be taxed by the United States Government only when dividends are declared and returned to the U.S. About two-thirds of American-owned or controlled tankers are registered under the flags of foreign countries (the flag state has general jurisdiction over a ship). In the last ten years the United States has dropped from holding registration on more than 60 per cent of the world's registered ships, to having only about 16 per cent today.

Ships registered in foreign countries are referred to as "flag of convenience" ships. By circumventing union

⁸James Ridgeway, The Politics of Ecology (New York: E. P. Dutton and Co. Inc., 1970), pp. 112-113.

wages, rules, and taxes, up to a 50 per cent savings in costs may be achieved.⁹ Under United Nations legislation to have the privileges associated with international recognition there must be a genuine link between a ship and the flag of the country it flies.

Today Liberia registers more merchant marine tonnage than any other nation. In 1947, when Panama began collecting fees every time a Panamanian flag ship left her ports, United States shipping interests began searching for a new flag of convenience. Three Wall Street law firms drew up legislation that was enacted in Monrovia and started Liberia registering ships. Liberia claims that its regulations governing registration, safety, and the granting of captains' papers are as tough as any nations. In reality it appears that American interests control Liberia's registration program. In the report on the investigation undertaken following the grounding of the Torrey Canyon, a ship of Liberian registry, no mention was made of the mechanical problems of the ship. Liberia also took more than a year for the report on the investigation into the Ocean Eagle casualty to be released. Nor has the country made known proposed changes under consideration relating to her maritime laws and regulations.¹⁰

⁹Robert Engler, The Politics of Oil (New York: MacMillan Company, 1961), pp. 176-180.

¹⁰Edward Cowan, "Mankind's Fouled Nest," The Nation, March 10, 1969, p. 306.

The large oil companies control much of the world oil supertanker fleet, but a few tycoons own a great deal of the tonnage. A Norwegian, Hilmar Reksten, is one of the biggest gamblers of the large owners, preferring to tie his tankers to short-term charters rather than the more conservative long-term contracts. Reksten, among others, had made a great deal of money since the Suez Canal closure in 1967 which set off a mad rush among oil companies to line up additional tankers able to make the long haul around the Cape of Good Hope.¹¹

New Yorker Daniel Ludwig's National Bulk Carriers is considered the world's largest single owner in terms of total tonnage, owning a fleet of 28 ships with a total tonnage of 3.6 million deadweight tons.¹²

The Greeks have continued their historical interest and investment in shipping. Fifty active Greek shipping families own 23.6 million dwt. of the estimated world total of 146 million dwt. of oil supertankers. The most publicized of the Golden Greeks are Aristotle Onassis with a 43-ship 2.5 million dwt. fleet, and Stavros Niarchos who owns a 55-ship 3.4 million dwt. fleet. Other Greeks of prominence include Costas Lemos, the Goulandus brothers, George Livanos,

¹¹"The Lush Era of the Tanker Tycoons," Newsweek, October 19, 1970, p. 94.

¹²Ibid., pp. 94-96. Note: Deadweight tonnage equals a ship's total carrying capacity including crew, provisions, and bunker fuel. Actual cargo capacity is slightly less--a 50 thousand ton deadweight tanker can handle 47 thousand tons of crude oil. The abbreviation dwt. is used for deadweight tons.

and John Carras.¹³

Two oriental shipping tycoons are very active in Hong Kong. Y. K. Pao's firm, World Wide Limited, ties its ships to long-term charters. By 1973 he should have a fleet of supertankers to rival the world's largest. C. Y. Tung is the other Chinese shipping titan.¹⁴

The Growth of the World Oil Supertanker Fleet

When the 224-ton Elizabeth Watts carried the world's first ocean-going oil shipment from Philadelphia to London in 1861, there was so much fear about seepage from her oil barrels that a crew had to be shanghaied to sail the ship. In 1886 the first ship built solely for oil transportation, the German vessel Glückauf (good luck), arrived in New York where her crew quickly changed her name to Fliegauf (blow-up).¹⁵

In London in 1890 a British merchant and trader named Marcus Samuel began devising plans to revolutionize the oil business. Samuel held a meeting with a London shipping broker named Fred Lane, the London agent for France's Baron Alphonse de Rothschild. Rothschild had rights to large amounts of Russian crude oil which he refined into kerosene.

¹³Ibid., pp. 95-96.

¹⁴Ibid., p. 96.

¹⁵"The Big Tanker Rush," Newsweek, November 6, 1967, p. 77.

Lane felt that Rothschild's kerosene and Samuel's trading contracts could challenge Standard Oil's dominate position in the East. Samuel and Lane traveled to Russia where they saw several primitive kerosene-carrying tanker ships that the Russians had produced. On returning to London, Samuel hired naval architect Fortescue Flannery who designed a new and safer tanker, a ship with several oil compartments separated by water-filled bulkheads.¹⁶

In 1891 the Suez Canal Company agreed to let the ships traverse its canal. On July 26, 1892, Samuel's first tanker sailed from England to Batum on the Black Sea where it loaded kerosene, traveled through the Suez Canal, and unloaded at Singapore and Hong Kong.¹⁷

In 1892 ten more tankers were launched and Samuel began moving kerosene at half of Standard Oil's price (Standard shipped kerosene in cans).¹⁸ By 1900 oil tankers were established as a significant arm of maritime shipping.

Ships have always been the most economical way to ship oil, but since the Second World War tanker size increases have cut the cost of oil transportation by two-thirds per barrel. The world's first tanker, the Glückauf, had a capacity of 2 thousand dwt.'s. During World War II the

¹⁶"The name of the Shell game: tankers," Business Week, March 8, 1969, p. 58.

¹⁷Ibid.

¹⁸Ibid.

average tanker was 11 thousand dwt.'s, by 1955 it had risen to an average of 15 thousand dwt.'s and the world's tanker fleet consisted of 44 million dwt.'s. In 1968 there were 3,400 tankers averaging 37 thousand dwt.'s and having a total capacity of 125 million dwt.'s.¹⁹

Over the last 25 years tanker capacity has increased more than six times and has more than doubled since 1960. It would take 6,600 vessels of World War II size to carry the same amount of oil as the 3,500 active tankers could carry in 1966.²⁰ Maximum tanker size has gone from less than 20 thousand dwt.'s in 1930 to a potential of one-million deadweight tons in the near future.

In 1967 the closure of the Suez Canal forced tankers to detour around the Cape of Good Hope in order to reach European refineries and markets. The trip added an additional 4,700 miles and 25 days of travel. The closure of the Canal created an immediate need for 16 million additional tons of shipping. The temporary shutdown of oil production in Libya, and the closing of the Mediterranean pipelines at the same time, increased the need for another 22 million tons of oil supertankers. Larger tankers were necessary to make this longer trip economical.

¹⁹Gray, pp. 12-13.

²⁰B. F. Cooke, "Oil Transportation by Sea," in Oil on the Sea, ed. by David Hoult (New York: Plenum Press, 1967), pp. 94-95.

A study completed in 1968 found that a 10 thousand dwt. tanker could move one barrel of oil 1,000 miles for 12-15 cents, a 200,000 dwt. tanker could transport the same barrel for 3 1/2-4 cents, and a 300,000 dwt. tanker could move the barrel for 2 1/4-3 cents.²¹

These economics hold up over longer voyages also. Transporting crude oil from the Middle East to the North Atlantic coast of the United States costs thirteen dollars a ton if carried in a 47,000 dwt. vessel, five dollars and seventy cents per ton in a 250,000 dwt. ship, and an estimated five dollars and fifteen cents in a 500,000 dwt. super-tanker.²²

Because of financing methods larger tankers cost about the same from the buyer's point of view. When a ship is ordered the buyer usually lines up a long-term charter, up to twenty years in length, and offers this contract as collateral for a loan. Depending on the type and length of the charter, banks will advance from 75 to 95 per cent of a ship's cost. Speculators who play the short term "spot" market for large, quick profits, often are given loans by shipyards backed by government money.²³

²¹Gray, p. 73.

²²"No Superports for Supertankers," Business Week, May 20, 1972, pp. 108-110.

²³Gregory H. Wierzynski, "Tankers Move the Oil That Moves the World," Fortune, September 1, 1967, p. 152.

It is felt that the economies of ever-increasing size will be controlled by a scarcity of deep harbors, shallow shipping lanes, and higher terminal and storage costs.

Today the world's oil tanker fleet consists of about 4,000 ships and is rapidly expanding. While the Torrey Canyon carried 119,000 tons of crude oil, many supertankers today handle cargoes in excess of 200,000 dwt.'s. The gross tonnage of the world fleet is projected to increase by 50 per cent between 1970 and 1974. In 1970 orders were placed for 491 tankers totaling 70.9 million dwt.'s. Of these 205 were in the 200,000 dwt. range.²⁴

Several 300,000 dwt. supertankers are now in use. They are 1,135 feet long (compared to 1,472 feet for the Empire State Building, and 984 feet for the Eiffel Tower), 175 feet wide, 105 feet deep, with an 81'6" draft. They are powered by a twin screw, steam turbine power plant which produces 34,000 shafthorse-power that propels the ship at fifteen and three-quarters knots on the average. Their four main cargo pumps can pump 3,500 cubic meters per hour of sea water. The ship has a tank washing system, an oil/water separating apparatus, and twenty-four tank spaces. They possess a short turning radius, but require one and one-quarter to two miles for an emergency stop, which takes about eleven minutes.²⁵

²⁴Ridgeway, pp. 111-112.

²⁵Cooke, pp. 99-101.

Three hundred and forty new tankers were due for delivery in 1971, with more than one hundred of them over 200,000 dwt.'s.²⁶ One British firm has ordered two 477,000 dwt. tankers from a firm in Japan. They are scheduled for delivery in 1972 and 1973. Japan currently leads the world in tanker production followed by Sweden, France, and Spain. Currently the largest tanker in use is the Nisseki Maru, a 366,812 dwt. behemoth, capable of transporting three million barrels of oil. In close second is another Japanese-produced vessel, the Universe Japan, a 326,000 dwt. ship. Andrew Neilson, chairman of the American Bureau of Shipping, stated: "I see no objection or technical difficulty in the way of the one-million dwt. tanker."²⁷

Today's modern tankers have private cabins and port-holes for all their crew. Officers have double beds and often take their wives with them. The ships are also equipped with several recreation rooms, twice-a-week movies, a photographic darkroom, snack room, ample alcoholic beverages, swimming pool, gymnasium, and a jogging track.²⁸

Technology has cut crew requirements to about thirty men. Computers have provided the impetus for less manpower. They are capable of setting a course and speed according to

²⁶"Racing to build supertankers," Business Week, August 7, 1971, p. 45.

²⁷Wietzynski, p. 85.

²⁸"The Tankerman's Eerie World," Time, March 29, 1971, pp. 48-49.

conditions, as well as loading and unloading their cargoes. When empty these ships, as is the case with all tankers, are prone to explosions from the mix of oxygen and oil fumes in empty oil tanks. They take two hours to hit a top speed of 16.5 knots, and require up to ten miles to stop unless they "slalom." Slaloming involves going from hard port to starboard and reduces the stopping distance to one and one-quarter to two miles. Research is being done on using parachutes to assist in stopping.²⁹

To make the big tankers more maneuverable British researchers in 1972 proposed a modification of the rudder. Rudders work by altering the flow of water so that one side experiences greater pressure than the other, causing a ship to turn. If a rudder is swung starboard the boat will turn toward starboard. However, if the angle of the rudder is greater than 35° the rudder causes so much turbulence that it loses its steering ability. To reduce the turbulence and increase the effective working angle of the rudder the British fitted rotating cylinders around the rudder posts of several ships. The cylinder contains its own motor and can spin in either direction. When the rudder is pushed to port, the cylinder is rotated clockwise directing the water against the back of the rudder and smoothing out the turbulence, allowing effective turning angles to be greater than 35°. In a test a 200 ton dwt. tanker could turn on

²⁹Ibid., pp. 48-49.

its own axis, stop in seconds, and operate its rudder at more than 90°. It is estimated that a 250,000 dwt. tanker could turn completely around in about 180 yards and come to a full halt in about a third of a mile.³⁰ Such a device probably could have prevented the grounding of the Torrey Canyon.

The new behemoth supertankers have necessitated new port facilities. Typical of one of the new ports is Bantry Bay located on the southwest coast of Ireland. Here Gulf Oil built a 25 million dollar oil terminal designed especially for six "Bantry Class" ships (312,000 dwt.'s) Gulf is chartering to haul oil from Kuwait. From Bantry Bay smaller tankers will transfer the crude to European refineries. The terminal has oil booms, skimmers, and four tug boats fitted with fire and dispersal equipment to fight oil spills.³¹

Elsewhere, other ports have been altered by dredging and redesign to handle the larger tankers. The Welsh port of Milford Haven has dredged its main channel to accommodate 200,000 dwt. supertankers, while Hamburg, Germany may be able to service 300,000 dwt. vessels in the near future. New projects for ports are also planned, underway, or being considered for Rotterdam, and Portland and Machiasport, Maine.

³⁰"The Super Rudder," Time, September 18, 1972, p. 63.

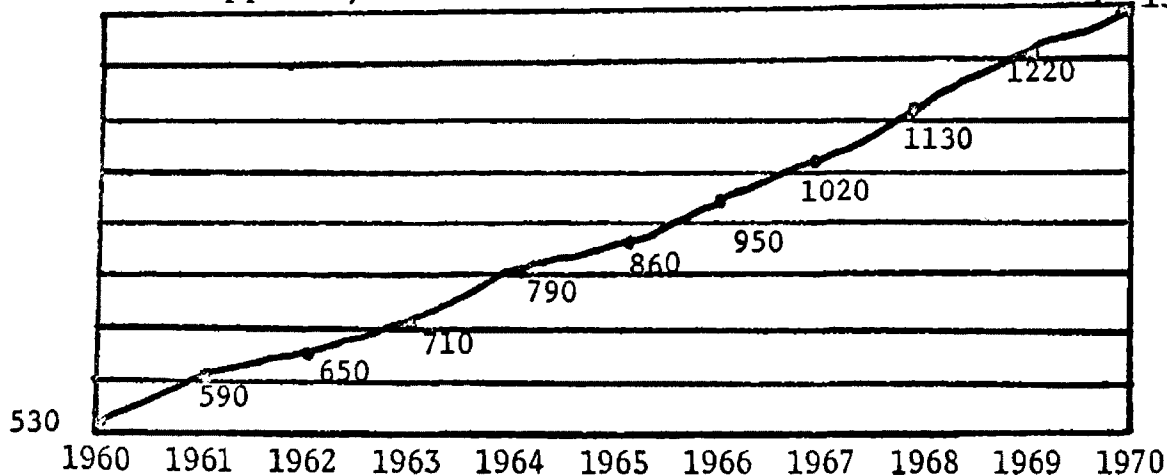
³¹Cooke, pp. 97-99.

Offshore terminal facilities similar to the one at Bantry Bay are planned for the mouth of Delaware Bay and Casco Bay located off Long Island.³²

Today half of all sea cargo is shipped by tanker. A billion tons of oil is carried by supertankers each year and most of it travels through one of a few busy channels. The most heavily traveled routes include the Gulf of Aden, the Malacca Strait (between Singapore and Indonesia), and the English Channel through which 25 per cent of all sea-going cargo passes.³³

The volume of petroleum products carried by tankers in world trade has nearly doubled since 1960, although the number of tankers has only risen from 3,200 to 4,000. The following graph illustrates this rise.

The Growth of Oil Carried by the World Supertanker Fleet:
(Oil shipped by tankers in world trade-metric tons) 1340 est.



Source: "More Oil Moving on the High Seas," U.S. News and World Report, February 8, 1971, p. 52.

³²McCaul1, p. 4.

³³Ridgeway, p. 115.

The Definition of Pollution

The production of pollutants is a bi-product of man's technology. Their manufacture has grown to the point that one person's trash basket has become the living space of another. Pollutants are resources knowingly or accidentally introduced into an eco-system not adapted to handle them. Within such systems they can end some biological processes, encourage or alter others, affect efficiency, and change the structure of living organisms. Further, they may damage non-living resources such as air and water, alter possessions, and affect recreation.³⁴

In the 1965 report of the President's Science Advisory Committee entitled "Restoring the Quality of Our Environment," the following definition was given for pollution:

Environmental pollution is the unfavorable alteration of our surrounding, wholly or largely as a by-product of man's actions, through direct or indirect effects of changes in energy patterns, radiation levels, chemical and physical constitution and abundances of organisms. These changes may affect man directly, or through his supplies of water and of agricultural and other biological products, his physical objects or possessions, or his opportunities for recreation and appreciation of nature.³⁵

The California State Water Quality Control Board has defined water pollution as "any impairment of its quality that adversely and unreasonably affects the subsequent

³⁴Edward J. Kormondy, Concepts of Ecology (Englewood Cliffs, N. J.: Prentice Hall Inc., 1969), pp. 179-180.

³⁵Ibid., p. 179.

beneficial uses of such water."³⁶

Sources of Marine Oil Pollution

Historically man has viewed the oceans as a limitless resource. Consequently, as a limitless body it provided the ultimate answer to waste disposal. Many of the things found obnoxious to society were consigned to the waters, and no outcry against the introduction of these effluents was heard until environmental disasters occurred. The oceans have tolerance and stresses that must be understood and respected if mankind is to avoid breaking the back of this precious and exhaustible resource.

Petroleum hydrocarbons enter the seas from several sources: natural submarine seepage, natural decay of marine organisms, shore-based industrial and transport activities, offshore drilling, and discharges from ships. Ships at sea may spill oil into the ocean by accidental spill, from tankers flushing oil tanks at sea, from dry cargo ships cleaning fuel tanks and bilges, and from spillage due to accidents. Of all the oceanic pollutants, oil is found in the largest quantities.

The annual influx of oil into the oceans by accidental oil spill is put at 200,000 tons. The Torrey Canyon wreck resulted in the best known accidental spill. To date

³⁶Frederick J. Burgess and Theodore A. Olson, ed., Pollution and Marine Ecology (New York, London, Sydney: John Wiley and Sons, 1967), p. 260.

the largest oil spills have taken place close to shore and their spillage has ended up on beaches and in shallow water areas. Because the modern supertankers have so much draft and are so difficult to stop, they are more likely than smaller tankers to end up stranded or in collisions. A serious accident involving one of these "monsters" could result in an oil spill equal to 20 per cent of the petroleum wastes entering the oceans in a year. The Santa Barbara offshore oil well "blowout" released only three to eleven thousand tons of oil, yet caused great damage.³⁷ It is estimated that a single barrel of oil can lay a slick over ten acres of water.

The limited data available on non-tanker dry cargo ships larger than 100 gross tons suggests that they discharged 500,000 tons of oily products into the ocean in 1969. Other sources of oil pollution include offshore oil drilling which yields 100,000 tons of oil effluents yearly, a figure expected to reach 320,000 tons in the near future if production continues to increase. Refineries and petrochemical plants add 300,000 tons of oil pollution a year and will reach 450,000 tons in 1975. The yearly total of other industrial and automotive wastes are placed at 550,000 tons, while natural seepage of oil from the ocean floor adds 100,000 tons per year, less than 5 per cent of the oceanic oil pollution caused by man. Seepage from the 4 million

³⁷William H. Matthews, Frederick E. Smith, and Edward D. Goldber, Man's Impact on Terrestrial and Oceanic Ecosystems (Cambridge, London: MIT Press, 1971), p. 299.

tons of oil contained in tonnage sunk during World War II contributes an undetermined amount.³⁸

The total oceanic oil pollution added up to 2.2 million tons for 1969, a figure projected to reach 3.3 to 4.8 million tons by 1980. When the above sources are added to the fallout of hydrocarbons precipitating from the atmosphere into the seas, this total may amount to as much as .5 per cent of the total world production of oil.³⁹

Oil Pollution Introduced to the Ocean by Ships

Significant oceanic oil pollution by ships dates from the post-World War I period when oil replaced coal as ship fuel. Oil discoveries in the Near East and South America have greatly increased the crude oil shipped to the United States and Northern Europe by tankers. Increased demand has led to increased production and a rise in the numbers and storage capacity of supertankers.⁴⁰

In the last 50 years it is estimated that 5 million tons of oil has been spilled into the sea. Every day an estimated one-third of the world's shipping tonnage is working carrying 20 to 30 million tons of oil in the world's shipping lanes from oilfields, to refineries, and to market.⁴¹

³⁸Ibid., pp. 300-302.

³⁹Ibid., p. 302.

⁴⁰Richard H. Wagner, Environment and Man (New York: W. W. Norton and Company Inc., 1971), p. 162.

⁴¹N. Pilpel, "The Natural Fate of Oil on the Sea," Endeavor, January, 1968, p. 11.

Dr. Max Blumer, a Massachusetts Institute of Technology scientist, estimates that the total loss of crude oil in ports, and at sea from accidents and intentional dumping, adds up to .1 per cent of all the oil carried at sea yearly. This represents approximately one million metric tons of crude oil spilled each year. Dr. Blumer believes that this volume equals the amount of hydrocarbons produced naturally by the oceans. However, the hydrocarbons naturally produced by the oceans are dispersed, while those artificially produced concentrate in sea lanes and ports.⁴²

A peculiarity of oil tankers is that they usually carry a cargo only one way. When traveling empty approximately one-third of their cargo tanks are filled with sea water for stability. If weather conditions become bad more ballast is taken on. Before receiving ballast water the ship's tanks are washed and sometimes cleaned. Because the wastes from washing and cleaning often cannot be unloaded at loading stations, the "load-on-top" (LOT) procedure has been developed to prevent the discharge of these wastes into the sea.

This procedure involves setting aside one of the ship's tanks to accept the oily slop water incurred from tank washing, cleaning, from oil pumps and lines, and from general ship clean-up. Waste water entering the slop tank

⁴²McCaul1, p. 13.

is allowed to settle. This results in a top layer of oil, a middle layer of an oil/water emulsion, and a bottom layer of water. The layer of water is pumped into the ocean until the emulsion level is reached. Eventually, the tanker has clean ballast, clean tanks, and a slop tank containing oil, oil/water emulsion, and several inches of water. When reloaded, crude oil is added on top of the slop tank, and if any separation occurs during a voyage the water is pumped off.⁴³

The "load-on-top" procedure is employed in 80 per cent of crude oil shipments. The other 20 per cent dump oily water from cleaning, and dirty ballast water from uncleaned tanks, into the sea, out of convenience, or in order to facilitate a quick turn around. This type of casual pollution is encouraged when ships must clean their tanks in order to receive a different type of oil cargo.⁴⁴

Normal operations of tankers introduced many tons of casual oil pollution into the waters. After a tanker the size of the Torrey Canyon has unloaded its cargo, 400 tons of crude remains in her pumps and lines. This oil can be pumped into a slop tank or simply discharged overboard. If the 20 per cent of the world's tankers presently not practicing the "load-on-top" procedure would employ it,

⁴³Ray Beynon and Graham Brockis, "Keeping Coasts Clean," New Scientist, XXXVII, 581 (January, 1968), p. 196.

⁴⁴Ibid., p. 196.

56,000 tons of oil would still find its way into the sea by 1975, and 75,000 tons in 1980. If this 20 per cent do not utilize this procedure, casual pollution will reach an estimated 800,000 tons in 1975, and 1.06 million tons by 1980.⁴⁵

The increase in tanker oil pollution is consistent with the increasing tonnage lost at sea in the past twenty years. Losses at sea totaled 200,000 tons in 1948, 430,000 tons in 1960, and mushroomed to 550,000 tons in 1963.⁴⁶

The wreck of large tankers, such as the Torrey Canyon, magnifies the amount of tonnage lost, as well as the volume of oil released into the sea. The crowding of the shipping lanes, caused by an increase in the size of the world's merchant marine, poses grave dangers to safety.

[The major sealanes for tankers include: the Persian Gulf, the Mediterranean, the coastal waters of Western Europe, and the coastal waters off the East coast of the United States. Significantly, all of these areas lie close to coastal areas.]

The dangers of a larger fleet of tankers with increased carrying capacity was summarized by a British panel of experts convened to investigate the Torrey Canyon grounding:

⁴⁵Matthews, p. 300.

⁴⁶McCaul1, pp. 2-3.

The risk of accident is a very real one. In the three years preceding the wreck of the Torrey Canyon, 91 tankers were stranded in various parts of the world, while 238 were involved in collisions either with tankers or other vessels. Over the world at large, tankers have thus been involved in potentially serious accidents on an average of about twice a week for the past three years [prior to 1967]. Sixteen of the 329 ships which were concerned became total losses; in 9 of the collisions fires broke out in one or both ships; and in 39 cases cargo spillage or leakage occurred.⁴⁷

According to the American Bureau of Shipping the last ten years have seen 488 tankers of 30,000 dwt. or greater registered. These vessels have been involved in 533 collisions, 17 collisions with underwater objects, and 3 collisions with ice. Some of the ships were involved in three or more collisions.⁴⁸

The following is a list of some of the significant twentieth-century marine mishaps associated with oil:

1907-The release of two million gallons of crude oil from the schooner Thomas W. Lawson caused the death of thousands of puffins on Annet Island.

1936-About 1,400 oil-soaked birds washed ashore on the south coast of Kent in England.

1938-1945-Oil released from ships sunk at sea decimated birds off England, Europe, and America.

1948-1958-A national survey in England showed from 50 to 250 thousand birds a year were killed by oil.

⁴⁷Report of the Committee of Scientists on the Scientific and Technological Aspects of the Torrey Canyon Disaster, The Torrey Canyon (London: Her Majesty's Stationery Office, 1967), pp. 3-4.

⁴⁸McCaul1, p. 3.

- 1952-1962-One hundred thousand birds died off Cornwall from pollution at sea.
- 1955-The wreck of the tanker Gerd Maevsk off the Elbe contributed heavily to the death of 275 thousand birds in northern Germany.
- 1959-The Second International Conference on Oil Pollution at Sea revealed an incidence of bird deaths comparable to those off England near Brittany, Belgium, Holland, Germany, the Gulf of St. Lawrence, and the Baltic, where tens of thousands of wildfowl were being killed in a central oil-dumping area.⁴⁹
- 1966-The tanker Seastern pumped 1,700 tons of oil into Midway Estuary, Kent, England, killing thousands of birds.
- 1967-The giant tanker Torrey Canyon ran aground off Lands End, England.
- 1968-The Ocean Eagle split up off Puerto Rico, flooding the coast with one million gallons of oil.
- World Glory broke in half off South Africa, spilling 46,000 tons of oil onto the coast.
- 1969-Hamilton Trader collided with another vessel, gushing oil all over the north Wales coast.
- 1970-The Liberian tanker Arrow, owned by Aristotle Onassis, and under charter to Standard Oil of New Jersey, hit a rock off Nova Scotia, broke her back and sank, spilling some 2 million gallons of heavy fuel into the Atlantic.
- The Liberian tanker Oceanic Grandeur broke its bottom in Torrey Strait off Australia, spilling 58,000 tons of oil.⁵⁰

Statistics reveal that accidental pollution caused by collisions offers the greatest threat of oil spillage, followed

⁴⁹Ibid., p. 11.

⁵⁰Ridgeway, pp. 115-117.

by the danger of grounding. In efforts to improve navigation, suggestions have been made that sophisticated equipment be made an international requirement for tankers of certain tonnage. Presently, many of the new supertankers are equipped with these devices. Also under consideration are recommendations dealing with guidance from onshore stations and suggestions for improving maneuverability.⁵¹

Future Problems of Marine Oil Pollution

Because man is rapidly using up the world's oil reserves, quantum increases in the number or capacity of supertankers seems unlikely. Regardless of this fact, marine oil pollution is expected to become more serious in the future. As supertankers begin transporting oil through very hazardous waters greater possibilities of accidents exist, while the increased use of a few shipping lanes and straits will make navigation more difficult. The continued use of offshore oil wells, and the associated deep water drilling, increases the chance of catastrophe, as does the highly toxic nature of synthetic oil and refined petroleum products now being transported by tanker.

The real need is not technology to treat spills, but rather technology to prevent spills and accidents, competent operating procedures. A step in this direction can be taken by better operational procedures, upgraded

⁵¹Beynon, p. 196.

training for tanker personnel, and stronger laws at all levels of government. The former head of the United States Environmental Protection Agency, William Ruckelshaus, believes that the oil industry will have to initiate new methods of avoiding spills before the public demands harsh restrictions.

Marine oil pollution is a prime example of how man is deteriorating rather than enhancing the productivity of the oceans. In approaching the problem attention must be directed toward controlling shipping in the Mediterranean, Black Sea, North Sea, Persian Gulf, and the Gulf of Mexico; bodies that make up only 2 per cent of the oceanic area, but which receive a disproportionate amount of casual and accidental oil pollution. On the high seas energy must be directed toward the subarctic and equatorial zones, such as the Sargasso Sea, areas where currents concentrate hydrocarbons. Enemies of safety include weather, fog, tight places, and above all--carelessness. Tanker personnel must learn to use the sophisticated devices which run super-tankers, but not to over-rely on them.

As man comes to depend more heavily on the sea for food he will have to exercise greater caution to insure that irreversible damage is not done to the marine food chain. The ocean must be viewed as an environment, not a resource--an environment that must be kept alive while man exploits her treasures.

Oil On the Water

Because oil spills are a relatively recent phenomenon no one knows exactly what effect they have on the seas. It is known that natural processes cause oil introduced into the sea to disappear with time. The two processes chiefly involved in oil degradation are dispersal and destruction. Dispersal involves evaporation of volatiles, emulsification with water, and sinking and beaching. Destruction involves spontaneous oxidation, and oxidation by microorganisms. These processes are influenced by many conditions: environmental factors such as sunlight, wind, waves, temperature, salinity, bacterial levels; and the type of oil involved, with regard to specific gravity, amount of refinement, quantity involved, and physical conditions.⁵²

Because of the great variety of crude oils, each has its own features that make it unique. In fact, each type has a chemical "fingerprint" that can be used to track down what oil field, or even what ship, an oil spill originated from. Regardless of the type of oil dumped into the oceans, all contain some volatiles that readily evaporate. It is estimated that up to 25 per cent of the oil dumped evaporates in a few days. Once the aromatics evaporate oil is relatively harmless to organisms, although it may exist in a layer thick enough to smother many crea-

⁵²Pilpel, p. 11.

tures. Photo-oxidation and bacterial decomposition take over and work on the remaining oil. After three months at sea these processes reduce the volume of oil dumped to 15 per cent of its original volume, leaving a dense asphaltic mass that is often washed up on shore. However, when oil is discharged close to shore most of it doesn't have time to be decomposed before being washed ashore.⁵³

Oil-in-water emulsions readily mix with sea water and are easily spread and dispersed in the ocean. Only if a spill occurs close to shore, or if the sea is very calm, is there much danger that the emulsified oil will reach a localized concentration high enough to harm marine life.⁵⁴

The other type of emulsion, water-in-oil does not mix with sea water. It consists of water droplets enclosed by oil and rendered stable by resins and asphaltic materials found naturally in crude oil. Because these emulsions contain up to 30 per cent water they are very hard to ignite. In the long run they have a consistency ranging from thick cream to road tar. Sometimes they remain in a thick layer, and at other times they break up into lumps. Some of this material washes ashore, some sinks, and the remaining matter is decomposed gradually. Water-in-oil emulsions can be sunk by three processes: 1) when they absorb

⁵³Wagner, pp. 165-166.

⁵⁴Pilpel, p. 12.

particulate material suspended in the ocean (such as sand, clay, and silt), 2) spontaneous oxidation, and 3) oxidation by microorganisms.⁵⁵ The water-in-oil emulsion becomes stabilized on the surface and then spreads across wide areas.

Oil that escapes these processes is broken down by spontaneous oxidation and oxidation by microorganisms (which cause the greatest decomposition at sea).

Spontaneous oxidation takes place when oil is converted by oxygen in the air and water into denser materials. The main decomposition of oil in water is caused by microorganisms. Different types of microorganisms attack different hydrocarbons found in oil. They are more effective in warmer seas and in areas with a higher oxygen content. Studies have shown that fairly thin slicks are colonized by bacteria in one to two weeks and completely decomposed in two to three months. As the microorganisms begin to feed, their numbers quickly grow and create a greater density on the oil which begins to sink. It is felt by many scientists that synthetic emulsifiers used to disperse oil at sea may actually slow down decomposition by reducing the bacterial population. This view is disputed by other scientists. Aerobic oxidation reduces oil to intermediate products, alcohols, acids, ketones, and others, which are more

⁵⁵Ibid., p. 7.

susceptible to microorganisms. The final products of this decomposition of oil are carbon dioxide and water.⁵⁶

Anaerobic oxidation takes place at a slower pace on oil that has sunk. The rate of decomposition depends on the supply of nitrates, phosphates, sulphates, and other mineral materials used by anaerobic microorganisms as oxygen sources. This process may be speeded up by artificially introducing the minerals mentioned. Anaerobic oxidation yields nitrogen, carbon dioxide, methane, and other gaseous hydrocarbons that rise and refloat a portion of the decomposing oil to the surface where it is again exposed to aerobic oxidation. This cycle continues until all of the oil is decomposed.⁵⁷

Dr. Richard E. Warner, a Canadian professor of environmental biology, has examined the problem of tanker break-ups. He reported that the decomposition of crude oil is a function of temperature. Decomposition is slowed down by cool temperatures, and at 32° Fahrenheit the process is drastically reduced, with some aspects of decomposition stopping altogether. His findings have grave implications for any tanker operations conducted in cold climates.⁵⁸ Oil spills occurring at temperatures below 32° could place oil

⁵⁶Ibid., p. 13.

⁵⁷Ibid.

⁵⁸Tom Brown, Oil on Ice (San Francisco: Sierra Club, 1971), pp. 10-11.

on shores where its decay would be so slow that the oil could last for decades or even centuries without significantly decomposing. Oil from the Torrey Canyon in such an environment would still be posing a serious threat to life.

Dispersants encourage the thinning of the slick due to a reduction in the oil/water interfacial tension. When mixing occurs fine oil droplet formation results, and a good dispersant prevents the droplets from again forming into a slick. This effect prevents the droplets from attaching to birds, sand, and other objects, but it also attenuates natural biodegradable action.⁵⁹ These dispersants are generally applied with high pressure hoses in order to encourage mixing. In using these chemicals care must be taken to ensure that they are not overapplied, or that the dispersants used are not more toxic than the oil itself.⁶⁰

Any oil that survives three months or more at sea forms into tarry lumps that may represent 15 per cent of the original spill. These lumps also form in the storage tanks of tankers, as well as in the fuel tanks of all ships. They often are washed into the sea by various cleaning actions.⁶¹

The Norwegian explorer, Thor Heyerdahl, and his crew on the papyrus reed raft the Ra observed these lumps

⁵⁹Ibid., pp. 35, 39.

⁶⁰Ibid., p. 50.

⁶¹McCaul1, p. 7.

several times during their 1969 journey across the Atlantic. Midway through the voyage Heyerdahl commented on one such incident:

The pollution is shocking. Madani is fishing up tarlike lumps as big as prunes and overgrown with little barnacles. Small crabs, worms and many-legged crustacea are living on some of them. In the afternoon the smooth surface of the sea was covered with enormous quantities of brown and black clots of asphalt, floating in something that looked like soap suds, and here and there the surface shimmered in all colors as if covered with gasoline.

In the same area a few of the stocking-like coelenterates were swimming. When alive they were taut like sausage-shaped balloons painted orange and green. However, thousands of them floated dead among the oil clots, collapsed and flat as punctured toy balloons. For two days we drifted in this muck of oil and dead coelenterates before sailing beyond it. . . .⁶²

Methods of Dealing With Oil On Water

The damage an oil slick poses to human resources and facilities often determines whether or not it will be treated. The Tampico, an oil tanker that ran aground off Baja, California, released an oil slick that was largely ignored because it occurred in an unpopulated area. In contrast, oil released from the Torrey Canyon disaster was thoroughly treated because it threatened recreation and economic resources.⁶³

Unlike many other marine pollutants, oil pollution occurring near inhabited areas is highly visible. The

⁶²Thor Heyerdahl, The Ra Expedition (Garden City, New York: Doubleday and Co. Inc., 1970), pp. 312-313.

⁶³Geoffrey Potts, "Unwanted Oil," Sea Frontiers, XIV, 4 (July-August, 1968), p. 222.

Torrey Canyon accident revealed that the oil and tanker businesses were ill-prepared for disasters of this scale. When the Ocean Eagle and the Santa Barbara and Louisiana coast incidents followed the grounding a new industry arose to devise methods of dealing with marine oil pollution.⁶⁴ Until these incidents the use of straw to soak up slicks was about the most sophisticated method used in dealing with spills.

As far back as the turn of the century there was concern with developing procedures for controlling oil on water. A 1902 patent application described a new method of removing oil from water: "the addition of the material to the water/oil mixture results in an attraction for the oil," and the material was also said to be useful in "recovering the substance by which the oil is thus extracted by removing the oil there from in any convenient manner so that such substance may be capable of repeated use."⁶⁵

No single method is useful in cleaning oil spills under all conditions. The method(s) employed are necessarily affected by the location of the pollution, weather and sea conditions, economic variables, and the consciences of those involved. The treatment of oil spills can be handled in several ways: (prevention, mechanical removal,

⁶⁴Michael Gruber, "The Great Ocean Sweepstakes," Sea Frontiers, XVII, 146 (May-June, 1971), p. 148.

⁶⁵Ibid., p. 146.

burning, detergents, and natural actions. These procedures are, of course, employed after a spill has occurred. A better alternative would be to prevent spills, an eventuality that will be possible only when technology, oil companies and tanker owners, and nation-states and international organizations co-operate in developing improved anti-pollution devices, better navigation, and enforceable laws.

The world's technology for dealing with oil pollution at sea lags far behind the technology generated to produce the ships and oil rigs which are the prime polluters. Scientists did an extensive study of the effects of the Torrey Canyon mishap and were not optimistic in their conclusion which stated: "We are progressively making a slum of nature and may eventually find that we are enjoying the benefit of science and industry under conditions which no civilized society should tolerate."⁶⁶

Ignition of oil on water is one method of disposing of slicks. Difficulties encountered with this procedure exist because crude oil exposed to air quickly loses many of its volatiles through evaporation, ignited oil transfers heat to the underlying water which can decrease the temperature of the oil below the flash point, and rough seas make it impractical. Burning was attempted ineffectively on the Torrey Canyon slick. Oil disposed of by burning presents

⁶⁶J. E. Smith ed., Torrey Canyon Pollution and Marine Life (Cambridge: Cambridge University Press, 1968), p. 14.

the additional problem of air pollution. Several corporations are developing materials that may be sprayed on oil where they act as a great number of wicks to facilitate the burning of oil.

Detergents may be employed to emulsify oil. The detergents used on oil are highly toxic and consist of a solvent, an active ingredient, and a surfactant which allow the active ingredient to penetrate the oil. The detergent may be sprayed from launches, high pressure back packs, or surface vehicles equipped with spraying equipment. However, if used on beaches they cause oil to sink into the sand. Detergents do not offer a final solution because they disperse rather than remove oil.⁶⁷

If left to natural action oil fractions that do not evaporate are attacked by bacteria, and limpets, which apparently can digest oil. Detergents attenuate or stop bacterial and limpet decomposition. Although natural decay is fairly slow it is significant to note that in the Tampico incident no artificial cleaning was undertaken, yet in less than a year no abnormal pollution could be found. This can be contrasted with the slick released from the Torrey Canyon which was heavily treated with detergents. Studies of the incident reveal that untreated crude oil would have caused less damage than the detergents which were employed.

⁶⁷Potts, pp. 229-231.

When application occurs at sea, and is followed by agitation, detergents seem to be of limited toxicity and quite effective in emulsifying and dispersing oil. Great caution must be used when there is a possibility that the detergent may be washed ashore. The British believe they have developed a non-toxic detergent, BP 1100, which is an extract of natural fat and is soluble in oil rather than water.

The best detergents for use in oil pollution are those which contain an emulsifier-solvent mixture in a mix of one-to-ten. This mixture should be applied in an amount of one-quarter to one-half of the volume of oil being treated.⁶⁸

Treatment should be followed by agitation. An analogy can be drawn to washing soil off of hands. A detergent, such as soap, used alone is of little use. To wash the oil off an oil-in-water emulsion must be formed. This can be achieved by wetting one's hands and then rubbing them together. The froth that results contains oil-in-water droplets which cannot coalesce because they are coated with an emulsifier.⁶⁹

For slicks on the high seas Shell Oil Company has a large dredge with 60-foot booms that spray treated sand on

⁶⁸Report of the Committee of Scientists, p. 2.

⁶⁹Ibid.

oil. The sand attracts the oil and sinks it. A drawback of this procedure is that it requires an equal weight of sand to the oil. Also, the oil that is sunk must still be decomposed. In experimental applications this procedure has sunk 100 tons of oil in fifteen minutes.⁷⁰

Experiments are being conducted on producing strains of bacteria which can exist on a slick long enough to break it up. Presently there is the problem of supplying adequate phosphates and nitrates which are used by the bacteria to metabolize the hydrocarbons. Yeasts are similarly being tested to measure their ability to metabolize the oil.⁷¹

Urethane chips may be sprayed onto a slick. They are left to absorb oil, retrieved by booms, have the oil squeezed out of them, and are then reused.

It remains to be seen if oil pollution control devices will be utilized once they are perfected. Short term economic goals may prevent their full and effective employment. A world-wide oceanic catastrophe may result if the ocean and its resources prove unable to absorb man's mistakes. What is progress for man may mean death for the oceans.

Ultimately the crux of the problem is political:
"What is conquered by technology must be governed, and in

⁷⁰Gruber, p. 158.

⁷¹Ibid., p. 159.

this respect an ocean subjected is no different from a nation subdued."⁷² Hopefully, regional and world wide supranational organizations, with the consent of the world's states, will develop the machinery necessary to manage the oceans effectively.

The Effect of Oil on Marine Associated Organisms

Man has lost the capacity to foresee
and to forestall. He will end by
destroying the earth.

Albert Schweitzer

In past eons photosynthesis by marine organisms produced hydrocarbons which accumulated and yielded fossil fuels. Today, man's misuse of these fossil fuels poses a threat to the same organisms which produced them.

Of all aquatic pollutants oil in its natural form is probably the least harmful biologically. Oil seepage has been going on for millions of years from the sea floor, and many microorganisms have developed to digest it.⁷³ The amount of hydrocarbons released naturally act to preserve the chemical balance of the area in which they are found, while man's oily effluents alter this balance.

Although the most easily seen effect on seabirds and inshore plant and animal life, the long-term effects of oil pollution are uncertain. Ongoing research is necessary to

⁷²Wesley Marx, The Frail Ocean (New York: Ballantine Books, 1967), p. 253.

⁷³Gruber, p. 147.

predict potential disasters in the processes of marine life.

Petroleum hydrocarbon pollutants in the marine environment can produce several consequences:

1. Poisoning of marine life filter feeders such as clams, oysters, scallops, and mussels; other invertebrates; fish, and marine birds.
2. Disruption of the ecosystem so as to induce long-term devastation of marine life.
3. Degradation of the environment for human use by reducing economic and recreational values on either a short or long-term basis and by changes of aesthetics or the marine environment.⁷⁴

Crude oil and oil fractions can poison marine organisms through various processes:

1. Direct kill through coating of surfaces. Hundreds of thousands of oceanic birds suffer and die because their feathers become fouled with oil which displaces the insulating air layer next to the skin. Oil also effects birds' flying ability and buoyancy.
2. Direct kill through contact poisoning.
3. Direct kill through exposure to the dissolved or colloidal toxic components of oil at some distance in space and time from the source.
4. Incorporation of sublethal amounts of oil into organisms, resulting in lowered resistance to infection and other stresses.⁷⁵

Disruption of the ecosystem may occur through:

1. Destruction of juvenile organisms.
2. Destruction of the food sources of higher species.
3. Interference with the communications system of

⁷⁴Matthews, p. 307.

⁷⁵Ibid., p. 308.

marine life.⁷⁶

An oil slick on the surface of the ocean inhibits the free exchange of oxygen and carbon dioxide between the atmosphere and the water. This affects the phytoplankton which exist in the top 100 meters of the sea. Plankton produce their food through photosynthesis and oil spills drastically cut the amount of ambient light that enters the water by up to 90 per cent at a depth of two meters. The ocean "fixes" about eighteen billion tons of carbon every year through photosynthesis. Although this seems to be a large amount, 90 per cent of the world's vegetation is located in the sea, and its floating diatoms produce 70 per cent of the world's oxygen.

The phytoplankton provide food for zooplankton (microscopic animals), which are, in turn, eaten by other animals. Because aromatic hydrocarbons don't naturally appear in marine organisms no bacteria able to digest them have evolved. Consequently they pass through the food chain and concentrate in the livers of animals. Rachael Carson described the delicate balance of the marine food chain:

What happens to a diatom in the upper sunlit strata of the sea may well determine what happens to a cod lying in a ledge of some rocky canyon a hundred fathoms below, or to a bed of multi-colored gorgeously plumed seaworms carpeting an underlying shoal, or to a prawn creeping over

⁷⁶Ibid.

the soft ooze of the sea floor in the blackness of mile-deep water.⁷⁷

In most instances man harvests the fish located at the end of the ocean's food chain. In the open ocean there are up to five links, usually three in coastal waters, and only two in areas of upwelling. Energy is lost at each stage of a food chain. Thus, the shorter the chain, or the lower on the chain food is harvested, the greater amount of energy that can be gathered. To produce one and a half ounces of edible tuna requires a pound of mackeral, ten pounds of herring, 100 pounds of zooplankton, and 500 pounds of phytoplankton. Phytoplankton (unicellular algae) initiate the food chain by fixing carbon into food through photosynthesis.⁷⁸

Water birds are also links in the marine food chain. Without them beaches would soon be unusable due to accumulated garbage. Garbage from ships would similarly join that of beach goers as it floated ashore. Birds are especially susceptible to the ravages of oil. An oil spill in the North Sea affected more than two-hundred thousand birds, and a sixty-five thousand ton crude oil spill from a supertanker in San Francisco Bay killed more than ten thousand birds. Dr. Claude ZoBell, a Scripps scientist,

⁷⁷Robert and Leona Rienow, "The Oil Around Us," New York Times Magazine, June 4, 1967, p. 110.

⁷⁸Wagner, pp. 445-446.

summarized the effects of oil on birds:

Attracted by patches of oil floating on the water, many kinds of birds alight in search of food, or more likely they inadvertantly swim into or emerge in oil after a dive. Their plumage becomes fouled with oil, some of which may penetrate down under the feathers to the skin, thereby displacing air which normally forms efficient insulation against cold. Consequently, large numbers of birds freeze to death in the winter and many more oil-fouled birds are unable to become airborne. They may helplessly drift ashore to die of starvation, disease, or predation. Some oil-fouled birds lose their buoyancey and sink.⁷⁹

Extremely low levels of chemical messengers are vital to many marine organisms in acting as messengers that play a role in finding food, escaping enemies, in homing instincts, in selecting habitats, and in sex attraction. Oil pollution is felt to interfere with the messages by affecting taste and by mimicking natural messages.⁸⁰

Fuel oil provides a greater pollution threat than crude oil due to its immediate toxicity. Distilled oil and tar products act on the nervous system by inducing excitement and hypersensitivity which causes problems in balance, locomotion, and breathing that often lead to death. Man is also threatened by cancerous compounds of refined oil such as benzopyrene, which are found in shellfish, oysters, mussels, and some fish. It is possible that these compounds concentrate at steps along the food chain.

⁷⁹Marx, pp. 71-72.

⁸⁰Blumer, pp. 10-11.

Dr. A. Nelson-Smith, an English scientist, studied the effects of a 250,500-ton oil spill at Milford Haven, which took place in 1967. The spill was treated by dispersants. The pollution partially or completely destroyed several varieties of snails on two nearby shores. A reduction was similarly found in the number of mussels, barnacles, and sea anemones, in some areas studied. Within eight months recolonization had begun in most areas. Dr. Nelson-Smith summarized the effect of oil in ports:

Because it may take several or many years to redress these balances, the ultimate effects of a single polluting incident, even as severe as that of the Torrey Canyon, are likely to be less marked than repeated pollution in the vicinity of oil ports such as Milford Haven.⁸¹

Conclusion

Some scholars maintain that the ocean has the potential to feed thirty billion people. To preserve this ability more research is needed to determine what level of oil elements are toxic to marine organisms and what the physiological effects of oil damage are. Studies should be done to pinpoint areas where oil pollution is concentrated, as well as to determine the fate of oil spread on the ocean. Technology must be encouraged to produce better methods of cleaning up spills, better anti-pollution measures for refinery and petrochemical operations, and improved devices for the

⁸¹McCaul1, pp. 11-12.



prevention of spills. Increased awareness of the environmental effects of spills and the technology available to treat them could have attenuated the impact of the Torrey Canyon disaster. Finally, nation-states and international organizations will have to develop better and more enforceable regulations and laws to control pollution. Dr. Claude ZoBell contends: "The oil pollution of the sea is still largely an unsolved international legalistic, technological, and economic problem."⁸² Loran P. Haxby, an expert on oil pollution succinctly stated: "In an age when we can reach the moon we should be able to do better than this."⁸³

Attention is now directed to a case study of the Torrey Canyon catastrophe. This event contributed a great deal to the technological development of methods to handle oil pollution, as well as to an addition of scientific information on the effects of oil on living organisms.

⁸²Marx, p. 74.

⁸³"The Black Tide," Time, December 26, 1969, p. 29.

CHAPTER III

THE TORREY CANYON CATASTROPHE

Introduction

At 8:50 a.m. on March 18, 1967, the biggest ship ever wrecked, the giant oil tanker Torrey Canyon, ran aground on Ballard Rock, part of Seven Stones Reef, sixteen miles west of Land's End, England. The ship was near the end of its voyage from Kuwait to Milford Haven with a cargo of 119,000 tons of crude oil (36,000,000 gallons). If converted to gasoline the tanker's cargo of crude oil would power 54,381 cars for one year. In grounding, the tanker suffered bottom damage over more than half her length, puncturing fourteen of her eighteen oil tanks. Almost immediately 30,000 tons of crude oil spilled from the ship's multiple wounds into the sea.

Subsequently, an oil slick, at one time twenty miles long, was driven on shore polluting more than one hundred miles of Cornish beaches. Cornwall is England's poorest county relying heavily on its 100-million dollar a year tourist industry. A change of wind later drove large quantities of the oil onto the French beaches north of Brittany. Attempts to disperse the oil with detergent

were only marginally effective and on March 28 the British Government ordered the Torrey Canyon set on fire by bombing from the air.

The wreck and the events that followed alerted world public opinion to the problem of casual oceanic oil pollution, the pollution that results from ships using coastal waters to wash out their cargo tanks and bilges. By revealing the enormous scale of the threats posed by giant supertankers the wreck also served to put the problem of oil pollution in a new perspective.

Maritime law is an intricate field which was complicated by the wreck. Some problems arose because so many nations were involved. The tanker was owned by Barracuda Tanker Corporation, a firm incorporated in Liberia with head offices in Bermuda. It was on long term lease to the Union Oil Company of California, chartered by the British firm of British Petroleum Corporation, and sailed by an Italian captain and crew under the Liberian flag. Additionally, the ship ran aground in international waters, polluted beaches and seas under the control of nation-states, and was destroyed by the British Government without the owner's consent.

The Ship and Her Master

The Torrey Canyon measured 974 feet in length, was the thirteenth largest merchant vessel in the world at the

time of her grounding, and was named after Union Oil's Torrey Canyon oil field located near Santa Barbara, California. The ship was designed for only one use--to carry oil on international ocean voyages. She was powered by two steam-powered turbines which turned her single screw with the power of 25,270 horses. The ship's fuel capacity of 12,300 tons was itself as large as the tonnage of the tankers of thirty years ago. Lloyd's Register of British and Foreign Shipping gave the Torrey Canyon its highest rating for seaworthiness.¹

The ship was originally built in 1958-1959 at Newport News, Virginia. Her original length was 810 feet. In March 1964, Union Oil announced that the ship would be jumboized in Japan to double her carrying capacity. In Japan an entire new mid-body and bow were built and the tanker's back end was cut off and joined to the larger front section. When finished, the over-hauled ship could carry 117,000 long tons of crude oil (long tons weigh 2,240 pounds each). The expansion allowed her to carry oil from the Persian Gulf to Los Angeles at a savings of a penny a barrel.²

An Italian, Pastrengo Rugiati, was the last master

¹Edward Cowan, Oil and Water (Philadelphia and New York: J. B. Lippincott, 1968), pp. 9-10. Note: All future Cowan citations refer to this book.

²Ibid.

of the Torrey Canyon. He was a professional merchant seaman trained at the Italian merchant marine academy. Captain Rugiati served in the Italian Navy during World War II. He assumed command of increasingly larger tankers. On March 22, 1966 he was appointed master of the Torrey Canyon.³

The Owners of the Torrey Canyon

Barracuda Tanker Corporation, a Liberian "front" company, incorporated in Monrovia, with head offices in a two room office located in Bermuda, was the official owner of the Torrey Canyon. The investment banking house of Dillon Read and Company Incorporated, located in New York City, set up Barracuda along with seven other companies to own facilities and lease them to the Union Oil Company. United States tax laws make leasing of shipping more practical than ownership.⁴ These investment bankers set up the eight companies to own facilities and lease them to the Union Oil Company. The companies are largely owned by the partners and families of Dillon Read.

Barracuda Tanker Corporation put up only twenty thousand dollars in order to gain title to three tankers, one being the Torrey Canyon, with a combined value of fifty-one million dollars. A long-term charter from Union

³Ibid., pp. 30-33.

⁴Ibid., pp. 20-21.

Oil, along with the mortgaging of the tankers, was used to obtain a loan to build the ships.⁵ Although the charter provided that the master and her crew would be servants of the owners, Union Oil operated the supertankers.

The Torrey Canyon's Last Journey

John I. Jacobs and Company Ltd., a London tanker brokerage firm, arranged the charter for the Torrey Canyon's last journey. Normally the ship carried oil for Union Oil, but having no need for her for several weeks, the company decided to hire the tanker out for extra income.

Temporary closure of the big pipeline in Syria forced British Petroleum Corporation to haul crude oil through the Suez Canal, or around the Cape of Good Hope, in order to meet her delivery schedule at European refineries. The longer trip necessitated the chartering of extra tank ships. The Torrey Canyon was available at a low charter rate because of a weak world demand for oil. British Petroleum hired the tanker for three-hundred and eighty-four thousand dollars to make a single trip from the Persian Gulf to a port in Britain or the Continent between February 13-20.⁶

⁵Ibid., p. 22.

⁶Ibid., pp. 13-20.

The tanker was on the last day of a twenty-eight day journey from the Persian Gulf port of Mina al Ahmadi in Kuwait, to Milford Haven, England, when she ran aground.

Early on Saturday, March 18, Captain Rugiati retired to his cabin after requesting that he be called when radio contact was established with the Scilly Isles. The ship was set on a course of 18° which would have taken her west of the Scillies. At 6:30 a.m. the Scillies appeared on the ship's radar off the port bow, rather than off the star-board side as originally intended. During the night the ship had been moved by the Rennell Current, a strong current which tends to the east. The chief officer, realizing that the ship was now on a course that would take the ship east of the isles, phoned the captain who informed him not to change the ship's bearing. When he arrived on deck Captain Rugiati set a new course between Seven Stones Reef and the Island of St. Martin's, one of the Scillies.⁷

The Channel Pilot, a book compiled by the British Admiralty, warns of the dangers associated with pursuing a course between Seven Stones Reef and the Scillies. It is significant to note that a copy of this book was not on board the Torrey Canyon when she wrecked. The Channel Pilot warns:

⁷James Fisher and Seline Charton, "A Tragedy of Errors," Audobon, LXIX (November, 1969), p. 72.

The actual width of the channel between the nearest of the Scilly Isles and Land's End is 21 miles; but as the route taken by all large vessels must be westward of Longships and should be eastward of Seven Stones light-vessel (which is located eastward of Seven Stones Reef), the navigable channel can only be considered as 12 miles wide. The lights render the passage perfectly simple at night as well as by day in ordinary clear weather, the greatest vigilance is necessary, and a vessel's position, even in the clearest weather, should be checked by cross bearing at short intervals.⁸

Captain Rugiati had been notified that the Torrey Canyon would be unable to unload her cargo for five days, due to low tides, if she did not reach Milford Haven by 11 p.m. Saturday. These were five days in which the ship could be making a return voyage for more oil. To follow a safe course west of the Scillies would take extra time. Captain Rugiati felt he needed four to five extra hours to reduce the tanker's draft from 52'4" to 52'2", the draft limit for the Torrey Canyon at Milford Haven. The reduction in draft would be accomplished by pumping oil from midships to fore draft tanks.⁹

In the later investigation the Chief Officer stated that this procedure could have been accomplished while the ship was underway, while Captain Rugiati maintained that the ship had to be still in the water to transfer the oil. The captain's shortcut, instead of saving 30,000 dollars, cost more than 24 million dollars.

⁸Cowan, p. 179.

⁹Ibid., pp. 46-47.

Midway through the passage between Land's End and the Scillies, Captain Rugiati desired to alter his course to a more westerly direction, but was prevented from doing so by a fishing boat off his port bow.

At about 8:40 it became apparent that the supertanker was much closer to the reef than desired. Captain Rugiati desperately ordered the helmsman to "come hard left," but the ship failed to respond. Rugiati then took the wheel himself, found that it was not engaged to the rudder, engaged the wheel, and had just begun to bring the ship hard port (to the left) when the supertanker grounded on Pollard Rock. The ship ripped into a jagged rock thirty feet below the surface at her top speed of sixteen knots per hour, tearing a 650-foot slash in her hull. The impact allowed thousands of gallons of crude oil to rush into the sea.¹⁰

Supertankers have a rudder selection lever with three positions. In automatic the ship is guided by computers, in the hand position the wheel governs the rudder, while in the control position a small lever to the left of the wheel controls the rudder. The selection lever was in the control position when Rusiati first ordered the helmsman to come hard left. Taking the wheel the captain moved the selection lever to manual and began turning the ship

¹⁰Fisher, p. 72.

just before the grounding. The helmsman claimed that he called Rugiati when the ship failed to respond to the wheel, but the captain contended he did not hear this warning.¹¹

Seven Stones Reef is so named because seven rocks break the surface of the water at low tide. Because the tides in this area normally range between 12-16 feet, the rocks are covered by only a few feet of water at high tide. This reef sits on one of the busiest trade routes in the world, and has been marked by a lightship since 1841. Although it is believed that many ships have struck and sunk on Seven Stones, there have been only fourteen recorded wrecks.¹²

Captain Rugiati immediately notified Milford Haven of the grounding and requested assistance. He reversed the ship's engines in a fruitless effort to back her off the reef. Next, an attempt was made to regain buoyancy by pumping oil overboard until the pumps failed.

Within two hours a Royal Navy helicopter was on the scene. At mid-day the Utrecht, a tugboat owned by the Dutch firm of Wijismuller, was the first salvage vessel to reach the scene. After receiving the consent of Union Oil Rugiati signed the standard "no-cure, no-pay" contract, drawn up by Lloyd's of London, with Wijismuller.

¹¹Cowan, p. 182.

¹²Crispin Gill, Frank Booker, and Tony Soper, The Wreck of the Torrey Canyon (Devon, England: David and Charles Limited, 1967), pp. 11-13.

In salvage work payment is dependent upon a successful retrieval, and the award is determined by arbitration. In the case of the Torrey Canyon a successful salvage operation would have been worth as much as four million dollars.

By Saturday afternoon two Royal Navy ships were on the scene spraying the oil slick produced by the grounding with detergent to try and emulsify the crude oil before it reached shore.

At the time of the stranding the Torrey Canyon was within visual range of a light ship, three light-houses, and a major radio beacon. Visibility was eight miles and the ship's captain and crew were experienced. Yet the ship was run onto a reef at top speed in a channel six miles wide.¹³ Safety devices on the bridge of the Torrey Canyon included: radar, two position-fixing devices, a radio telephone, depth measuring fathometer, and a device for recording the ship's course. One resident of Cornwall stated: "It was a remarkable feat to run that ship aground at high tide on a calm, sunny morning on a notorious reef marked by a lightship."¹⁴

If the captain had made the turn to port a minute or so earlier, had the fishing vessel not checked his original desire to turn, and if precious moments had not been lost in the confusion over the position of the rudder control lever,

¹³Fisher, pp. 74-75.

¹⁴"Battling the Blob," Newsweek, April 3, 1967, p. 46.

the ship would have cleared the Seven Stone Reef.¹⁵ With a single navigational error Captain Rugiati polluted more square miles of ocean than any other sailor in history.

The Oil at Sea

Prior to the Torrey Canyon grounding the greatest amount of oil spilled in the waters near the British Isles was 10,000 tons. The Government had no one authority or ministry set up to deal with oil pollution. The only guide available was the 1961 study and report undertaken at the Warren Springs Laboratory at Stevenage on cleaning beaches, and the removal and dispersal of oil at sea.¹⁶

An oil slick eighteen miles long by four miles wide was soon drifting from the Torrey Canyon. As consternation spread in Britain, Prime Minister Wilson set up a ministerial level committee, designated "Operation Canute," to coordinate local procedures to deal with the disaster. Royal Navy Under Secretary, Maurice Foley, was selected to direct the counterattack. For the first few days concern was to lay with dislodging the tanker, rather than with worry about pollution damage.

On March 19, Mr. Foley attended a coordination meeting at Royal Naval Headquarters, Devonport. An appeal to local fishermen was made to lend their boats to fight the

¹⁵Gill, p. 120.

¹⁶Ibid., p. 48.

oil. Fifteen thousand gallons of detergent were soon on their way to Cornwall.¹⁷

A London Times correspondent described the scene shortly after the accident:

Somewhere between the Isles of Scillies and Land's End the seas are blanketed by probably the largest patch of oil since the supertankers began sailing. . . .

A small force of the Royal Navy is already spraying the oil with detergent to neutralize it. The task is like trying to mop the Kensington Round Pond dry with a sponge

No further warning is needed that new protection services must be organized to deal with the menace of oil. Ideally they should be international in character. They should use the resources available to governments and industry.¹⁸

Nearly a week passed after the stranding before the oil reached the beaches, yet few areas were prepared. The Navy was over-optimistic in its evaluation of its ability to keep the oil off the shore. Actually, the wind and currents, rather than the naval efforts, kept the oil at sea. For two months the movement of the oil was dictated by high spring tides coupled with the wind. No network existed to distribute detergent or personnel, and spraying equipment and detergent were scarce. Due to the shortage of spraying equipment, ships often dumped forty-five gallon drums of detergent overboard and churned it with their props to

¹⁷Julian Mounter, "Save beaches order by Govt.", The Times [London], March 20, 1967, p. 1.

¹⁸"In peril from the sea," The Times (of London), March 20, 1967, p. 13.

achieve emulsion.

At highwater on the evening of March 18, the Utrecht unsuccessfully attempted to pass a towing cable to the Torrey Canyon. On the morning of Sunday, March 19, towing cables were secured to the stricken ship by several tugs, but they were unsuccessful in pulling the ship off the reef. That afternoon, as the tanker continued to grind and yaw to one side, Captain Rugiati ordered all crew members, except for himself and three officers, evacuated by lifeboat and helicopter.

By Sunday afternoon the Navy was recommending that the ship and her cargo be burned. However, Mr. Foley accepted the viewpoint that a ship in international waters could not be burned without the permission of the owners. Rather than destroy the tanker against the wishes of its owner and underwriters, yet risk failure in destroying the oil, the Wilson Government decided to refrain from a course of action for which there was no precedent. The Government had to consider the political and legal consequences of any action it might take. International law had not considered that a ship stranded in international waters would be capable of threatening areas under the control of nation-states. Due to Britain's long history of due process of law, and unsure of what actions it could legally take, the Government yielded to Union Oil's wishes that the salvors be permitted to act.

By Monday, March 20, spraying of detergents at sea on an oil slick that had spread over 100 square miles was being undertaken by eighteen ships. Salvage operations were going full force as Wijsmuller had flown in specialized equipment and salvage experts. Large compressors were to be employed to force air into the Torrey Canyon's storage tanks in an attempt to refloat her.

Mr. Dennis Healey, Secretary of State for Defense, announced on Monday in the House of Commons that the Government had authorized up to five-hundred thousand pounds to deal with the oil escaping from the stricken ship. When asked about setting fire to the ship to destroy the oil, he replied that the company owning the ship should first agree, and also many technical and practical problems would be involved in firing the ship. In reply to another question with the cost of clean-up, Mr. Healey stated that the question of paying for the cost of the operation would have to be considered later.¹⁹

In Devenport, Mr. Foley was also asked about the possibility of blowing up the supertanker. He retorted: "All I can say at this juncture, is that until the owners have declared the ship a total loss there can be no question of firing it."²⁰

¹⁹"500,000 pounds to cope with sq. miles of oil," The Times [London], March 21, 1967, p. 1.

²⁰Ibid.

Julian Mounter, a London Times correspondent described the situation on March 20 after having flown over the wreck:

For a few miles southwest of Land's End the seascape was filthy with the oil; it varies in color from a dark streaky blue to a thick and pale brown.

Everywhere is the sickening smell. After a while, one can taste oil . . .

The Torrey Canyon was basking in warm sunshine, firmly on the Ballard Rock, the most northerly of the Seven Stones, a slow swill washing her star-board deck.²¹

Efforts to refloat the ship continued and air compressors from all over Britain were rushed in in continuing attempts to pump the tanker full of air.

On Tuesday, March 21, an explosion in the Torrey Canyon engine room tore a gaping hole in the tanker fatally injuring one of the salvage crew. The explosion blew three men into the sea and resulted in the evacuation of the tanker's remaining four crew members, as well as the fourteen salvage crew members placed onboard.

The explosion resulted either from the build-up of compressed air, or more realistically by a build-up of gas from the crude oil in the engine room. At 9 a.m. on Tuesday, a gas build-up was detected in the engine room and emergency electricity was shut off. Around noon the explosion was set off when a member of the salvage crew opened the door of the engine room in order to make an inspection. Captain Albert Staal, a Wijismuller salvage expert, later died from injuries

²¹Julian Mounter, "Detergent on Troubled Waters," The Times [London], March 21, 1967, p. 12.

received in this incident.²²

Surprisingly, the Wilson Government allowed salvage efforts to continue following the explosion. Preparations were renewed to refloat the tanker on Wednesday after several large compressors were lowered to the ship's deck by helicopter. Nineteen ships were now engaged in battling the oil at sea with detergent as the oil crept toward the Cornish coast.

On Tuesday, Prime Minister Wilson called Sir Sully Zuckerman, the Government's chief scientific adviser, and requested that he form an emergency committee composed of eminent scientists to advise the Government.

On Wednesday, the Standing Emergency Committee formed by Zuckerman, and chaired by Home Secretary Roy Jenkins, met for the first time. This Committee was composed of fourteen of the most able scientists and engineers in the British Government. The group authorized the hiring of fourteen additional ships to disperse detergent and raised the budget for the disaster from 1.4 to 2.8 million dollars. Various questions dealing with the grounding were parceled out to members according to their specialization.

On Thursday, March 23, salvage operations were continuing, the weather was good, and the oil was breaking up into

²²Basil Gingell, "Explosion On The Stricken Tanker," The Times [London], March 22, 1967, p. 1.

large patches. Twenty-four ships were now engaged in the battle at sea, and the compressed air being forced into the ship's hold was slowly correcting her list.

People from all over the world contributed loony ideas for dealing with the oil. One suggested refloating the Torrey Canyon by filling her belly with balloons and ping-pong balls. Someone else proposed covering Cornwall's oyster beds with blotting paper to protect them from oil, while another suggestion was that the oil on the ocean be congealed with sonic booms and scooped up with fish nets.²³

Much of the oil spilled from the tanker formed an oil-in-water emulsion containing 30 to 80 per cent water. This mixture is generally referred to as "chocolate mousse" and if untreated tends to be a persistent problem. The spraying fleet was inadequate to deal with the oil on the sea except when spraying was followed by agitation. This action resulted in some permanent dispersion.

On Friday, March 24, the wind changed from the northwest to southeast, pushing the crude towards Cornish beaches. The compressed air continued to push the ship to an upright position and there were high hopes of towing the Torrey Canyon off the rocks during the high spring tides predicted for the week-end.

²³"Britain's Great Ghastly Ooze," Newsweek, April 10, 1967, p. 51.

As the oil approached the shore it was decided that the Navy would be responsible for spraying detergent to within 300 yards of shore. From this line inward local authorities would apply detergent from private boats. Finally, on the beaches, soldiers and civilians would deal with the oil as it washed ashore.

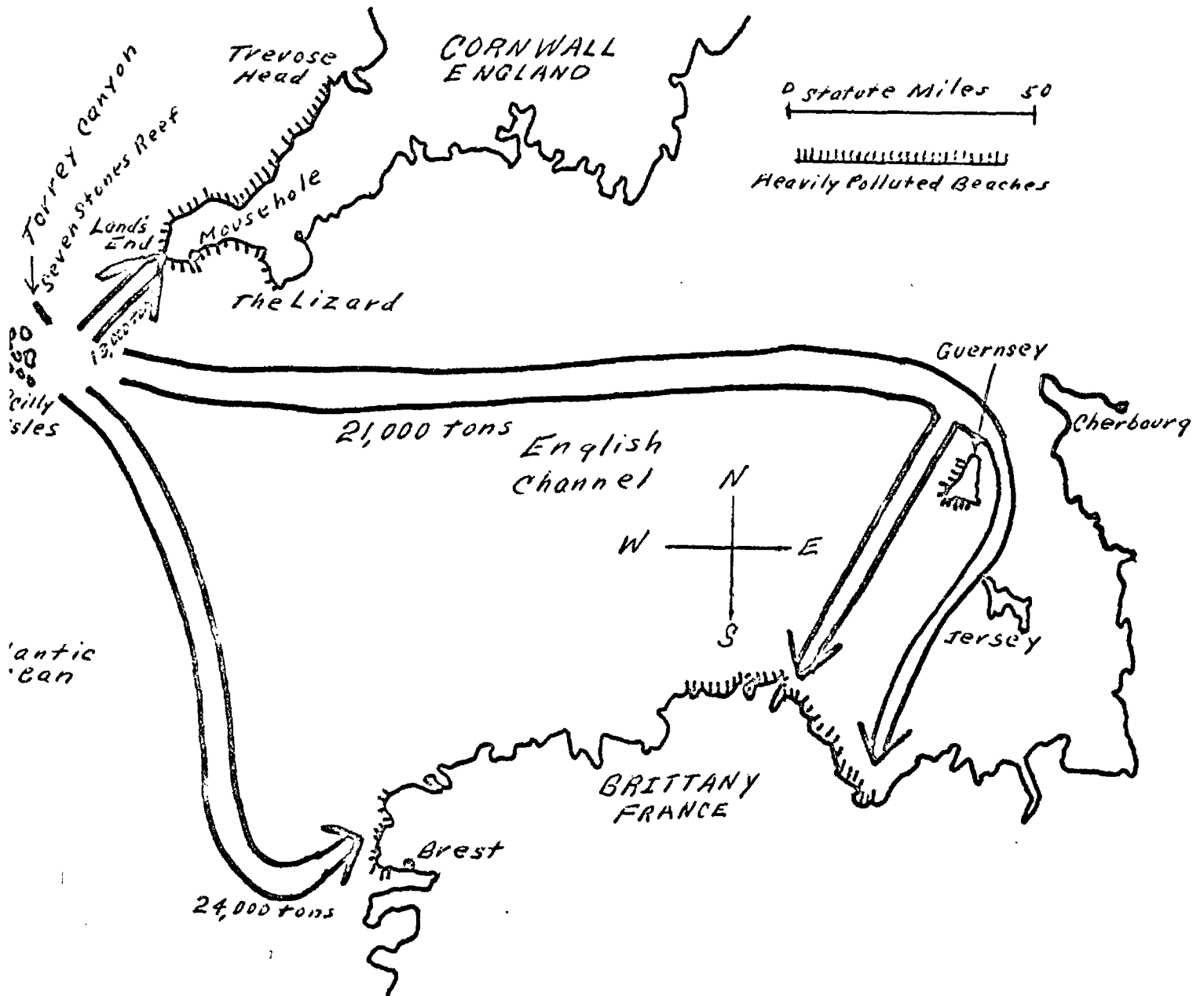
Oil on British Beaches

The first oil reached the beaches on the Cornish coast during the evening of Friday, March 24, and Saturday morning. The oil began contaminating the beaches during spring tides which in 1967 were at the highest recorded level in thirty years. Eventually, 140 miles of Cornish coastline were affected, including forty holiday beaches.

Prime Minister Wilson placed Anthony Greenwood, the Minister of Housing and Local Government, in charge of coordinating the activities of local authorities and services in cleaning the beaches. Additionally, ministers were placed in charge at local headquarters set up at Plymouth, Portsmouth, and Lilkestone. Mount Wise, an Army base in Plymouth, was designated combined operations headquarters.²⁴ The Government announced that it would meet expenditures by local governments greater than a 2d rate.

²⁴Report of the Committee of Scientists, p. 25.

The Spread of Oil from the Torrey Canyon



Source: Crispin Gill, Frank Booker, and Tony Soper, The Wreck of the Torrey Canyon (Newton Abbot, England: David and Charles Limited, p. 69. Julian McCaull, "Black Tide," Environment, X, 9 (November, 1969), p. 13.

One observer described the situation soon after the first oil arrived:

It was a scene reminiscent of the dark days of 1940 when all Britain was braced for the landings of the Nazi hordes. Behind a forward screen of Royal Navy vessels, scores of small Royal Air Force rescue boats and civilian craft waited to catch the enemy inshore. And on the beaches hundreds of Tommies and Royal Marines readied themselves to meet the final assault.²⁵

Women emptied containers of kitchen detergents into the Atlantic, while 2,000 soldiers and marines, wearing goggles to protect their eyes, sprayed detergent from the shore. Fire trucks washed down docks with high-pressure hoses.²⁶

Oil on the beaches was treated in three ways: dispersal by detergent, burning where it lay or after it was collected, and by mechanical removal.

One cogent commentator stated:

The tide and strong wind played strange tricks. Oil was sucked out by one tide and swirled in by another, but everywhere it came it left a thick, greasy scum on wall, rocks, and sand.

So all-pervading was the oil that no concentrated attack could be made along the entire length of the coast. Instead, in the first hours of the black invasion, each little port or resort fought its individual battle with the menace.²⁷

The beaches were under the control of local authorities assisted by Army and Royal Marine Personnel who ran

²⁵"Battling the Blob," p. 44.

²⁶Ibid., p. 48.

²⁷Gill, pp. 60-61.

moving equipment, aided in beach clearance, and distributed detergent. As a result of experiments the Government recommended that a 12 inch layer of heavily polluted beach be pushed by earth moving equipment to the low-water mark and there sprayed with detergent. After washing by the tide the whole area was chain harrowed and lightly treated with detergent. The bulk of the oil was cleared by the end of April.²⁸

Ten days following the grounding detergents were being delivered at the rate of 100,000 gallons per day. Two-million five-hundred thousand gallons were used each day on the sea. The 700,000 gallons applied at sea are estimated to have emulsified at least 15,000 tons of the oil.²⁹ Up to forty-two ships were used: twenty-nine offshore, thirteen inshore, but never more than twenty-five at any one time. Probably no more than 60,000 tons of oil ever reached shore.

The following comment was made about the application of detergents:

Detergents were being hosed almost continuously and in high concentrations, onto the surface of the surface of the stranded oil, and the milky fluid ran in streams down the shore to the sea . . .

In the exposed middle reaches of the shore, there developed within hours a scene of progressive devastation, and within a few days

²⁸Report of the Committee of Scientists, p. 24.

²⁹Ibid., p. 23.

virtually nothing remained save for tufts of dead and dying algae. The rock surfaces were utterly bare of animals and littered at their bases with cemeteries of shells. Lower down the shore, nearer the low tide mark, the mortality, though still great, was not total. . . .³⁰

By and large the Government and local authorities acted promptly. Officials were hindered by the scale of the operation, the lack of knowledge of oil spills, and the improvised nature of equipment used. Angry fishermen were among the first to protest, stating that they thought their interests had been trampled on for the sake of the tourist trade.

At one point the struggle against the oil caused tempers to flare. At this juncture Mr. Foley stated: "Some local authorities have acted more quickly than others. Some have been lethargic."³¹ Alderman K. G. Foster, Chairman of Cornwall County Council, replied to this statement by declaring: "Local authorities have bent over backwards to give every assistance they can to the major problem."³²

Julian Mounter speculated about some future aesthetic damages caused by the pollution:

Even when or if the oil is removed, local authorities will face a massive cleaning job. Telephone kiosks, pavements, promenades and public lavatories near beaches are already showing signs of footwear infection. One

³⁰McCaul1, p. 19.

³¹Gill, p. 67.

³²Ibid., p. 68.

Pensance hotel proprietor was reported to be thinking of banning the wearing of shoes in his hotel to save his carpets.³³

No oil clearing suction vessel was available for use in conditions presented by the wreck. To aid in a disaster of this nature a ship would have to have a large recovery rate, be able to stay on site for considerable periods, and work under rough weather conditions.³⁴

Because oil artificially sunk tends to refloat after a time, the use of granular material to sink the oil was also deemed impractical. This method of dealing with the oil requires less material to sink the oil than to immobilize it permanently, fouls fishermen's nets, and may prove dangerous to fish.³⁵

Scavenger materials, those which absorb the oil on the surface and are then collected in an easily collectible mass, were also considered. The scale of the oil, rough weather, cost, and the amount of material required to be effective, proved prohibitive in the Torrey Canyon incident.³⁶

Burning the oil on the ocean's surface was not possible because oil on water quickly loses its flammable volatiles and also because existing weather conditions made it impractical.

³³Ibid., p. 64.

³⁴Report of the Committee of Scientists, p. 24.

³⁵Ibid., p. 25.

³⁶Ibid., p. 26.

Three-thousand feet of Aeroprene boom were ordered for use in encircling the Torrey Canyon, and eight miles of naval anti-submarine boom netting were made available by the Government. Many improvised booms were used with differing degrees of success. The Aeroprene boom was delivered too late to be used around the tanker. It was used elsewhere, but it soon broke.

After meeting with Union Oil representatives on Monday night, March 20, Mr. Foley sent a message to the Defense Minister and the Prime Minister which stated that the "combined opinion" of the Admiralty Salvage Chief, and Union Oil officials, "is that there is a reasonable chance of the Torrey Canyon being got off the rocks by Sunday . . ."³⁷

Even though high tide on Saturday, Sunday, and Monday, would bring five to six more feet of water than when the tanker stranded, efforts to free the Torrey Canyon would still be complicated. Chief Salvage Inspector Henc Vijnsla reported that the tanker would have to be lifted twenty feet before she could clear the rocks that were thought to be penetrating fifteen to seventeen feet into the ship's bottom.³⁸

On Sunday, March 26, salvage operators attempted to pull the tanker free in the late afternoon with the use of

³⁷Cowan, pp. 70-71.

³⁸"Tanker May Be Freed Today," The Times [London], March 25, 1967, p. 1.

four tugs. During this operation the cable linking the two largest tugs to the tanker snapped. Shortly thereafter, at about 6 p.m., the Torrey Canyon broke her back releasing about 50,000 more tons of oil. The tanker split down both sides of the hull, forcing the abandonment of salvage efforts.³⁹ Eight and one-half days of high tides and strong winds had taken their toll.

Culdrose Royal Naval Air Station was the location for a secret meeting that moved the Government toward a decision to destroy the tanker. Publically it was announced after this meeting that if the Torrey Canyon were successfully refloated she probably would not be allowed to enter British territorial waters.⁴⁰

On Sunday night Prime Minister Wilson made the following statement:

Although the reports are that the wreck is breaking up and more oil is going into the sea, the fact remains that until dawn tomorrow it is impossible to say whether salvage is still possible. It could happen that the physical act of the ship breaking in two has eased the salvage problem.⁴¹

Under the prevailing conditions no further salvage attempts could succeed, and removal of the oil to other tankers standing by, or laying at a distance, was considered impractical. The use of explosive charges placed on board, gelling

³⁹Report of the Committee of Scientists, pp. 6-7.

⁴⁰Cowan, pp. 92-93.

⁴¹Ibid., p. 95.

and freezing agents, and mechanical means were considered and dismissed. Under the prevailing conditions the only practical method of dealing with the oil remaining in the hull was bombing.

Union Oil said it would not object to firing the remaining oil on the tanker if the British Government and the ship's underwriters agreed. However, a Union Oil spokesman stressed that any decision had to be a three-party one. When questioned about Union Oil providing compensation to third parties injured by the oil, the spokesman replied that the question of liability could not be determined until the fact involved in the cause of the accident was known.⁴²

In dealing with the wreck of the Torrey Canyon the interests of the ship's owners, salvors, and the British Government were all different. The owners, although covered by insurance, wanted to ensure that they did not allow the ship to be deliberately destroyed unless all other measures failed. The salvage company, operating with a "no-cure, no-pay" contract, struggled to save the vessel beyond the point where they had a reasonable chance of success. This left the Wilson Government with the responsibility of preventing the damage caused by the oil discharged into the sea. The wreck of modern supertankers is not merely a

⁴²"Firm want three party agreement," The Times [London], March 28, 1967, p. 1.

disaster for itself and other vessels involved, it may also injure innocent third parties. Neither insurance nor international law took into account the interests of third parties; technology had outstripped both law and custom.⁴³

On Monday, Mr. Foley concluded that the ship could not be saved. He conveyed his thoughts to Home Secretary Jenkins who discussed it with Prime Minister Wilson. Mr. Wilson gave the go-ahead to begin the bombing in an attempt to destroy the 50,000 to 60,000 tons of crude oil remaining in the ship's hold.

On Tuesday, March 28, Union Oil announced to its insurance underwriters that the company was abandoning the ship. Upon notification by Union Oil, Wijsmuller withdrew, and the Treasury Solicitor was notified that the ship was being abandoned, thus terminating all salvage operations.

Firing the oil had to be done quickly so the crude oil's inflammable volatiles would not evaporate. For proper combustion it was vital that the oil remain in the ship and that it receive a good supply of oxygen. At first, charges were to be placed on-board the ship, but her breakup on Sunday made this impractical. Bombing from the air was finally decided upon.⁴⁴ The goal of the bombing was to penetrate the deck above each undamaged tank and set the

⁴³"The Torrey Canyon Case," The Times [London], March 28, 1967, p. 9.

⁴⁴"Battling the Blob," p. 51.

remaining oil onfire without sinking the ship.

On Tuesday, Royal Navy Buccaneer aircraft came in at 2,500 feet and 500 miles per hour to deliver 1,000-pound bombs designed to explode after crashing into the Torrey Canyon's oil tanks. In the three days of bombing 161,000 pounds of explosives, 9,800 gallons of kerosene, 3,200 gallons of napalm, and sixteen rockets were used in this "explosive surgery." It is estimated that the explosives, which cost 2.5 million dollars, burned twenty-thousand tons of oil. A month after the stranding the bow section sank, and on April 21, the stern disappeared into the sea.

On April 5, Naval operations ceased at sea and the main pollution fighting efforts were transferred to the beaches. On April 26, a great deal of new pollution occurred at formally cleaned beaches. Oil sucked by wind and tides was drawn out from isolated coves along the English coast. Finally, on June 14 and 15, an eight-man team of navy divers inspected the wreck of the Torrey Canyon and concluded that no further oil was on board.

Manuevering Undertaken by the British Government

Citizens and opposition members of Parliament began voicing criticism of governmental actions when it became apparent that many individual losses were not protected by liability legislation or insurance. The Government was also taken to task for delaying the bombing of the Torrey Canyon.

Stung by the mass of critical statements, the Wilson Government responded by defending its actions. Unsure of what legal action it could take under the ambiguities of international law, the Government called for a refinement and clarification of maritime law.

Soon after the bombing an outcry arose against the Wilson Government for acting so slowly. A London Times editorial led the attack stating: "Instead of playing around with hoses, why hasn't the Government ordered the bombing of the Torrey Canyon earlier?"⁴⁵ This editorial also criticized the Government for accepting the idea that the tanker could be refloated.

Mr. Edward Heath, the leader of the Opposition, said he believed that if the bombing was possible when it was undertaken, it should have been possible at an earlier time. The Government replied by emphasizing that the bombing had not been prevented by legal or economic considerations.⁴⁶

Home Secretary Roy Jenkins defended the actions of the Government by emphasizing that the owners and salvors had not been consulted on the final decision to bomb the tanker. When asked if a Board of Trade Inquiry would be held on the ship's grounding in international waters, Mr. Jenkins replied that the Government was concerned with

⁴⁵The Times [London], April 5, 1967.

⁴⁶"Mr. Heath asks reason for delay," The Times [London], March 29, 1967, p. 1.

emergency oil pollution, not with an inquest at this point.

He stated that:

. . . it should be clear in everybody's mind what has been the governing factor in what we are doing. The overriding factor has been to minimize pollution; legal and financial considerations have not been our concern. International law has not been considered from the time the ship floundered.⁴⁷

Mr. Wilson also defended his Government's actions.

He stated: "Last week it was right to give the salvage people a chance to get the ship away."⁴⁸ He went on to say that an earlier bombing may have led to increased pollution. "We took the law into our own hands yesterday [March 20]," he said. "If it was necessary a week earlier we would have taken it earlier."⁴⁹

Wilson informed the back-benchers of Government efforts to deal with the disaster in a statement he read before the House of Commons. He stated that international action was needed to deal with supertankers and their cargoes, and for this reason he urged that the United Nations Intergovernmental Maritime Consultative Organization be called into emergency session to deal with the problems of supertankers. His comments included the following statements:

⁴⁷"Doomed Tanker Splits in Three," The Times [London], March 28, 1967, p. 1.

⁴⁸"Napalm Used in Bombing," The Times [London], March 30, 1967, p. 1.

⁴⁹Ibid., p. 1.

We are now urgently considering the proposals which are to be put before the Intergovernmental Maritime Consultative Organization to ensure that new international regulations and any necessary changes in international law and practice can be pressed with the urgency that is required. . . .

Without waiting for international agreement we are also considering any action which lies within our own control, including control of the routes taken by these giant tankers and other ships carrying potentially dangerous cargoes into British ports. The old concept of territorial waters is not enough. . . .

Equally the question of legal liability and insurance must be considered both on a national and international level. . . .⁵⁰

In a question period following his statement to the House Mr. Wilson was questioned about the legal problems associated with the disaster. On this subject he stated:

We intend with regard to law, liability and insurance matters, to pursue this internationally, but it is more probable that action may have to be taken on a national level. This will include some of the wider aspects of maritime practice. . . .

For example I do not know whether we will wait for the usual time to get an international convention ratified to make sure whether ships of this size, carrying potentially dangerous substances, should be free to approach our shores in any way that they chose, and should not be proceeding on rules laid down many miles out by the Admiralty. . .

We have to consider national and international action to deal with the routing of tankers approaching our shores. We can refuse them access if they refuse to follow routes laid down by the Admiralty. . . .⁵¹

Some MP's felt that the niceties of maritime law and the interests of big business stood in the way of earlier,

⁵⁰"P.M. envisage Admiralty setting routes for big tankers," The Times [London], April 5, 1967, p. 7.

⁵¹"Investigation proposal brings hint of early debate," The Times [London], April 5, 1967, p. 7.

more decisive action.

The Prime Minister insisted that the beaches and sea would be clear by summer and urged vacationers not to cancel their vacation plans. To support this statement he announced that he would be taking his traditional holiday at his Scillies cottage in August.

On March 29, Prime Minister Wilson said that the idea "you can economize in the cost of imports or increase oil profits by using flags of convenience has received rather a wide shock by what has happened."⁵²

On April 12, Mr. Anthony Grover, Chairman of Lloyd's Register, stated that underwriters had never been very hopeful that the Torrey Canyon could be salvaged. He chastised Prime Minister Wilson for his complaints about flags of convenience. Mr. Grover stated:

I do not think there is any reason to suppose that Liberian registration means that the ships are of lower registration than British. Certainly this is increasingly so in the last ten years, because I believe that a very large proportion of the Liberian register covers ships which are not more than ten years old.⁵³

He further stated: "I do not think you can ever legislate against disasters like the Torrey Canyon disaster."⁵⁴ Mr. Grover did feel that rules governing ships' routes and tankers' procedures could be set by statute and international

⁵²"Napalm Used in Bombing," The Times [London], March 30, 1967, p. 1.

⁵³"Lloyd's were not hopeful about salvaging tanker," The Times [London], April 4, p. 2.

⁵⁴Ibid.

legislation.

The Earl of Langford spoke for the Government when questions were raised about the handling of the Torrey Canyon grounding in the House of Lords. When asked who would bear the expenses for individual costs and losses, the Earl replied:

The Government are not legally responsible for payment of compensation in respect of damages sustained by individuals. Any claimant wishing to bring an individual claim against the owners of the tankers would be well advised to consult his solicitor about the legal complexities before embarking on such a course.⁵⁵

He added: "At this point it would be wrong of me to give the impression that those who have suffered damages can look to the Government for redress."⁵⁶

A Government White Paper defending Governmental action was released on April 4. This report concluded:

The Government are now considering the lessons, both national and international to be drawn from the Torrey Canyon incident. They have taken the initiative in convening an early meeting of the International Maritime Consultative Organization to consider what changes are required in international maritime law and practice. . . .

The Government believe this to be the best means of bringing ships carrying oil under closer control with a view to safeguarding coastlines and marine life against the increasing risk of large-scale accidents involving pollution. The law relating to international shipping is highly complex and in a number of respects quite out of date. . . .

⁵⁵"Torrey Canyon damages," The Times [London], April 5, 1967, p. 6.

⁵⁶Ibid., p. 6.

The overriding concern of the Government throughout has been to preserve the coasts from oil pollution and to adopt the course most likely to achieve this end. Neither legal nor financial consideration inhibited Government action at any stage. . . .⁵⁷

According to the paper there were three possible methods of disposing of the oil in the ship: to pump it into other vessels, to refloat the ship and tow her away, or to burn the oil remaining on the ship.⁵⁸ The report also revealed that the Government was ready to buy the salvors out if the ship were refloated. If this happened the Government could then dispose of the ship.

The Government Emergency Committee suggested that Britain recommend to IMCO that it amend and codify the law on international shipping. Prime Minister Wilson and his Cabinet felt that pressure by IMCO would be the quickest and easiest way to establish more control over supertankers and to safeguard the world's shores against oceanic oil pollution.⁵⁹

The Intergovernmental Maritime Consultative Organization agreed to call an emergency meeting in London on May 4 and 5 at which time it set up inquiries into fifteen fields of maritime law and practice. One study concentrated on actions a state threatened by dangerous cargoes may take

⁵⁷"Tanker damage prospect 'less daunting than feared'," The Times [London], April 5, 1967, p. 7.

⁵⁸Ibid.

⁵⁹David Wood, "Britain to press for a tanker code," The Times [London], March 31, 1967, p. 1.

after an accident, while another committee delved into the amount of liability a ship owner or operator should be responsible for.⁶⁰

Oil in France

French officials felt that pollution might affect the Cotentin peninsula, and Picardy, but the chance of oil pollution reaching Brittany was thought to be a thousand-to-one. It was hoped that French shores would be saved by the prevailing southwest winds (northwest winds would carry the oil toward France). President Pompidou appointed a Torrey Canyon oil committee headed by Francis Raoul, the Director of the National Civil Protection Service within the Ministry of the Interior. This organization was unprepared for the first oil that reached France, although they had had three weeks in which to prepare for it. The British had warned them that the oil would eventually drift onto French beaches and French officials were even sent to observe British clean-up operations.

Oil first reached the Cherbourg peninsula on April 5 and quickly spread along the north coast of Brittany. The main damage was done in the first four days following the arrival of the oil on the beaches, during which time the French Government delayed in deciding whether to mobilize

⁶⁰Rodney Cowton, "Far-reaching inquiries on sea law," The Times [London], May 6, 1967, p. 2.

the army and whether to set aside three million dollars to fight the pollution.⁶¹

Many Breton hotelkeepers found their beaches a foot deep in oil and the picturesque pink granite rocks in the area became coated with gooey crude oil. The greatest danger of damage was not to aesthetics, but was posed to the seabirds of the area. An estimated 25,000 of them perished from the effects of the oil.

Polluted areas soon extended along sixty of Brittany's 950 miles of beaches. The oil was thicker on the beaches than in Cornwall, up to twelve inches deep and was virtually continuous along the coast. There was some damage done to oyster and mussel beds in the area. Fish prices soon dropped from 30 to 60 per cent because people feared they would eat contaminated fish.

Residents in areas affected by the oil reacted bitterly to what they regarded as the last minute action of Paris in dealing with the situation. Public opinion became so vehement that the Government was forced to declare twenty-five coastal villages in two departments of Brittany disaster areas. In the long run the Government committed substantial financial and military aid to deal with the oil.⁶²

⁶¹"Letter From Paris," New Yorker, April 29, 1967, p. 166.

⁶²Gill, p. 81.

The operation in France was conducted in three stages. At sea French vessels sprinkled sawdust and other coagulants, just off the coast two-hundred requisitioned fishing boats did the same, while on the beaches fifteen-hundred soldiers aided thousands of civilians in cleaning up the beaches.

France made a wise decision when she decided not to use detergents to disperse the oil. Instead coagulants and mechanical means were widely employed. Detergents would have threatened Brittany's fishing, mussel, and oyster industries. One coagulant used was a German product with a silicone-base which gathered the oil into balls that were easily removed by nets.⁶³ Altogether some 600,000 cubic feet of coagulants were employed: sawdust, pumice, and polyester chips being used most extensively.

By the end of April thirty-eight beaches had been affected, about 4,200 tons of oil had been removed, and 7,500 tons of sawdust used. Ten miles of floating booms were in use and another thirty miles was on order and being laid at the rate of several miles per day. Workers on the beaches had put in 27,300 days of work.⁶⁴ The last oil at sea was sunk by the French Navy in 1,000 feet of water in the Bay of Biscay.

⁶³"A Tragedy of Errors," pp. 77-78.

⁶⁴Gill, p. 87.

The Hearing Conducted by the Liberian Government on the
Stranding

The Liberian Government called a Board of Investigation to assess the stranding of the Torrey Canyon. The hearing convened in Genoa's Hotel Columbia Excelsior on April 3. The three-man board was appointed by Albert J. Rudick, a New Yorker who was Liberia's Deputy Commissioner of Maritime Affairs. The Board consisted of: James V. C. Malcolmson, a retired naval architect who was a former Vice-President of Texaco; Kenneth H. Volk, a lawyer with the New York admiralty law firm of Burlingham, Underwood, Barron, Wright, and White; and Roy I. Melita, the full-time assistant to Rudick.⁶⁵

Because Liberia had no rule of procedure for such hearings, a British civil servant, sent as an observer, invoked the displeasure of Union Oil officials. Union Oil feared that the man might prejudice the oil company's chances in future legal actions.

The hearing was convened under Chapter IX of the Liberian Maritime Regulations. A section of this chapter reads that investigations may be called:

. . . as may be necessary to determine as closely as possible the cause of the casualty or accident and whether any act of misconduct, inattention to duty, negligence or willful violation of the law on the part of any licensed or certified person contributed to the accident, so that appropriate

⁶⁵Cowan, pp. 171-172.

proceedings may be recommended and taken against the license or certificate.⁶⁶

At the inquiry Captain Rugiati testified that a cargo transfer would have been necessary from midships to the forward tanks before the Torrey Canyon could enter Milford Haven harbor. He felt this shifting was necessary for the ship's bottom to clear the narrow channel leading into the port. Although Rugiati stated that this transfer could only be made if the ship was stopped in the water, his Chief Officer stated that the transfer could have been completed in four and one-half to five hours while the ship was moving.⁶⁷

Captain Rugiati also defended his choice of route. He said that a course that would have taken the ship west of the Scillies would add about eight miles or twenty-nine minutes to the journey. He feared that this lengthened course would cause the tanker to miss the tide at Milford Haven result in a five day delay.⁶⁸

On May 2, the Department of the Treasury in Monrovia published the report on the hearing which concluded that the Captain alone was responsible for the casualty. The final report held that:

⁶⁶Ibid., p. 177.

⁶⁷"Tanker Raced to Catch High Tide," The Times [London], May 4, 1967, p. 1.

⁶⁸Ibid., p. 1.

. . . the master was imprudent in his decision to pass to the east of the Scilly Islands instead of to the west as originally intended. Considering the facts that the master's experience in the waters to the east of the Islands was very limited and that the Torrey Canyon was an extremely large and deeply loaded tanker, the Board feels that the decision to pass to the east of the Islands exposed the vessel to an unnecessary risk which could easily have been avoided. Furthermore, when he was advised shortly before 7 a.m. that the vessel was to the east of the projected track, in the Board's opinion the master should have gone to the bridge, conferred with the chief officer and weighed the situation carefully before making his decision on how he would pass the Scilly Islands.⁶⁹

The report stated that the cargo transfer could have been achieved at sea and that Captain Rugiati's decision to pass to the east of the Scillies was made at his own discretion. It cited the Captain for: failing to consult his officers, not showing good judgment of seamanship, continuing to use automatic steering near the Scillies, and failure to reduce speed before the stranding. Finally, the report concluded, that there were no mechanical failures on the ship. It recommended the suspension of Rugiati's masters license.⁷⁰ In September 1967, Liberia revoked Captain Pastrengo Rusiati's masters license.

One positive suggestion came out of the hearing. The board suggested that the stranding of the Torrey Canyon demonstrated the need for an international agreement to set up sea

⁶⁹Cowan, p. 185.

⁷⁰"Tanker Raced to Catch High Tide," p. 4.

lanes for vessels passing near coasts or in hazardous waters.

The hearing failed to investigate some circumstances relevant to the accident. It neglected to mention that the tanker carried no sailing directions for British waters and that Captain Rugiati stated on two past occasions that he had trouble with the tanker's steering mechanism.

A leading French maritime expert, Commandant Louis Oudet, questioned the impartiality of the Liberian Government's inquiry. He claimed that national tribunals may have interest in hiding the facts about sea disasters. He felt that an international tribunal should apportion responsibility in such cases. The Commandant commented:

We know little of the circumstances in which she went aground and it is possible that one will learn no more.

The American experts who conducted the inquiry, theoretically on behalf of the Liberian Government, could only have had as their object to inform the owning shipping company. In putting the blame on the captain they discharged the company itself of responsibility, but is important to know whether their judgment was impartial. The composition of the board of inquiry shows no guarantee in this regard.⁷¹

Commandant Oudet felt that an international tribunal could apportion responsibility, adjust losses, and possess police power.

The Torrey Canyon and Existing British Law

The legal problems associated with the Torrey Canyon

⁷¹"Doubt raised over Torrey Canyon," The Times [London], February 1, 1968, p. 2.

were put into perspective by one writer when he stated:
 "When oil from a Liberian tanker grounded in international waters and controlled by an American Company smears your rugs, whom do you sue?"⁷²

Because the sea lanes around Britain are the world's busiest, it is reasonable to assume that a great number of tanker accidents, as well as a great deal of oceanic oil pollution, will occur in the waters off Britain.⁷³

The liability of a ship's owners for damage caused by their negligence is governed by British law. Fines were limited by the Merchant Shipping Act of 1894 to eight pounds per net ton of weight. In 1958 this amount was increased by an amendment to the act that raised maximum liability to twenty-five pounds thirteen shillings per net ton.⁷⁴

In the case of the Torrey Canyon the liability of the ship's owners for damage caused by their negligence was limited to one-million five-hundred thousand pounds. In oil pollution cases those liable for legal action are the employers of the master and crew upon whom a writ can be served under British Law. A 1956 act extended English law in this area by making it possible to arrest a sister ship

⁷²Marx, p. 4.

⁷³Ibid.

⁷⁴Philip Howard, "Little Redress For Victims of Oil," The Times [London], March 28, 1968, p. 8.

owned by the owners of an offending vessel. In all cases of this nature negligence must be proven.⁷⁵

In 1955 Great Britain passed the Oil in Navigable Waters Act which prohibits the discharge of oil in United Kingdom territorial waters. The maximum penalty is 1,000 pounds for a conviction, with no time limit on indictments. Oil pollution has been growing around the British Isles, but only 4,700 pounds were collected in fines during the first twelve years following this act's enactment.⁷⁶

English law seemed to prevent Cornish councils from suing to collect damages. In 1954 the oil tanker Inverpool ran aground near the town of Southport and deliberately pumped 400 tons of oil overboard in order to get clear. A claim for damages against the owners failed. A British judge, Justice Devline, held that there was no duty under common law for shipping to avoid depositing oil in coastal waters. He said: "If Parliament considers that further legislation is necessary for the protection of the public, no doubt such legislation will be enacted."⁷⁷ It is significant to note that at the time of the Torrey Canyon's grounding no further legislation had been passed.

Later, a Court of Appeals reversed the above ruling and declared the vessel liable for discharging oil and

⁷⁵Ibid.

⁷⁶Gill, pp. 46-47.

⁷⁷"Little Redress For Victims of Oil," p. 4.

damaging the shore. The House of Lords reversed the decision on appeal.

A ship is not considered derelict under British law until the owners officially abandon all hope of recovery or salvage. Once abandonment has taken place, anyone can claim any part of the ship; and presumably even bomb it. A party who bombs a ship before it is declared derelict risks a liable suit. Section 515 of the Merchant Shipping Act states that owners can sue for compensation: "any person riotously or tumultuously assembled together who plunder, damage, or destroy any wrecked vessel or any part of its cargo or apparel."⁷⁸

Legal Steps Pursued by Great Britain and France

The Torrey Canyon was insured for 16.5 million dollars, while her cargo of crude oil was covered for a sum in excess of one-million dollars. Protection and indemnity insurance, in the amount of 2.5 million dollars, was also held to protect third parties.⁷⁹ This insurance covered the ship in damages to: persons, piers, or other objects, while the ship was in operation. Union Oil was responsible for claims over the amount of insurance coverage.

Some seventy United States companies were involved

⁷⁸Ibid.

⁷⁹"In the Oily Wake of a Tragedy at Sea," U.S. News and World Report, April 10, 1967, p. 18.

in the Hull Insurance Syndicate that wrote half of the 16.5 million dollar coverage. Other American companies held 10 per cent of the remaining insurance, while London firms had underwritten the remaining 40 per cent. One-quarter of the total amount was carried by Lloyds of London.⁸⁰ Any insurance monies collected for damage to the ship were to go to Union Oil, the beneficiary of the policy.

Mr. P. A. Fureman, a London expert on maritime law, stated that he felt interference with the Torrey Canyon without permission of the owners could be considered piracy because the ship was wrecked on the high seas. When the owners gave notice of the abandonment to the underwriters, and if the underwriters accepted, which they did not, then they would have succeeded as owners. To collect damages against anyone interfering with their ship the owners, or the underwriters if they had succeeded in ownership, would have had to prove damage. This was thought to be difficult when the ship in question was breaking up under natural conditions at sea.⁸¹

One day after the bombing of the Torrey Canyon Prime Minister Wilson announced that a writ for damages would be issued against the owners of the tanker.

⁸⁰Ibid.

⁸¹Norman Fowlers, "Owners Were Not Consulted," The Times [London], March 28, 1967, p. 1.

On April 4, Sir Harvey Druitt, the Procurator General and Treasury Solicitor, informed the owners that solicitors of the Government intended to proceed for damages. At this time it was felt that proceedings could be begun in Britain, Bermuda, Liberia, and/or America. During this period of preliminary legal action Britain ordered ships carrying dangerous cargoes to follow routes set by the Admiralty, even though this could involve extending jurisdiction to the twelve mile limit or beyond. These rules were to apply to all ships that desired to unload their cargoes in British ports.⁸²

On May 4, the Wilson Government issued a writ for damages against Barracuda Tanker Corporation, the owners of the Torrey Canyon. The writ named the tanker's sister ships, the Sansinena, and the Lake Palourde.

In English law a writ is a notice to appear before a court in a civil suit. By issuing the writ against the two ships the British Government established the right to arrest them if and when they appeared in the territorial waters of Britain. Arresting the ships of an owner against whom there is a claim is known as proceeding in rem. It is an action against the thing, the tankers, when the person-Barracuda, a foreign corporation, is unreachable.⁸³

⁸²David Wood, "Govt. to sue over tanker," The Times [London], April 5, 1967, p. 1.

⁸³Cowan, p. 193.

A press release from the Government stated: "This writ is in respect of damage, loss, and expense sustained by, or on the behalf of the Crown, as a result of the stranding of the Torrey Canyon. The Treasury Solicitor has also instructed his agents to issue a writ in Bermuda."⁸⁴ This action left it up to Barracuda Tanker to decide if they wished to appear in English court, a Bermuda court, or not appear at all. If Barracuda decided to make an appearance in court, Britain would have to prove negligence in order to collect damages.

Also in May, the Government issued additional writs in all ports subject to British law. Because these writs were issued but never served, Barracuda may have been unaware of their existence. To this point the Government's case appeared dim. Barracuda was unlikely to appear in London, or to allow her two other supertankers to call at a port controlled by British law.⁸⁵

In Bermuda, on May 12, the law firm of Conyers, Dill, and Pearman entered an appearance for Barracuda. At this juncture the Treasury Solicitor was preparing to deliver his pleadings in Bermuda, although damages awarded there would be limited by the extent of Barracuda's assets there,

⁸⁴Michael Baily, "Writ for Torrey Canyon owners," May 5, 1967, p. 2.

⁸⁵"Whitehall success in T.C. trap," The Times [London], July 18, 1967, p. 8.

which were negligible.⁸⁶

Barracuda's parent, Union Oil, used Bermuda largely for taxation purposes. Hopefully, if a Bermuda court awarded damages, the Torrey Canyon's insurers would pay damages; although they were under no legal obligation to do so.

Professor Joseph Sweeney of Fordham University, a recognized expert of maritime law, offered his preliminary analysis of who could, and who could not, sue:

- 1) The British Government could not sue anyone because damages to the British economy and the cost of clean-up were not covered by existing international convention.
- 2) Hotel and restaurant owners whose businesses were affected were out of luck for the same reasons.
- 3) Anyone who lived along the water and whose life work was affected by the wreck, could sue under the 1954 international convention designed to prevent oil pollution of the sea.⁸⁷

The ship owners could defend themselves by claiming:

- 1) They took reasonable precautions after the wreck to minimize the oil pollution and damage.
- 2) The flow of oil toward shore was an Act of God, and therefore the owner would not be responsible.
- 3) Even if these defenses should fail, liability was limited under British law to 66 dollars

⁸⁶Ibid.

⁸⁷"The Lawyers' View," Newsweek, April 10, 1967, pp. 51-52.

per ton, or about 3.4 million dollars in the case of the Torrey Canyon.

- 4) The shipowner probably could not sue the British Government for the bombing because it occurred to a non-British ship outside of Britain's territorial waters.
- 5) The cargo owners probably could sue the ship owner for loss of cargo, although the crew could not be held responsible.
- 6) The cargo owners could also sue the British Government, who in return could defend themselves by claiming that they acted in defense of the realm.⁸⁸

On July 15, the Lake Palourde was arrested in Singapore harbor. On a trip from California to the Persian Gulf the tanker urgently required two coils of wire rope. It was arranged for the rope to be delivered outside the three mile limit near Singapore. Arriving at the designated rendezvous and finding no ship with the rope, the Lake Palourde proceeded into Singapore harbor. She had been in port only a few minutes when a Government lawyer, accompanied by the Baliff of the High Court of Singapore, appeared in a launch and boarded the Lake Palourde. The Baliff affixed a warrant of arrest to the ship's main mast, thus impounding her.⁸⁹

To release the ship Britain demanded an eight million dollar bond as security, the amount of damages and expenses Britain incurred in fighting the wreck and the oil. Britain

⁸⁸ Ibid.

⁸⁹ Cowan, p. 195.

further demanded that Barracuda appear in Singapore's High Court to acknowledge the Court's jurisdiction in the case. On July 19, the Phoenix Assurance Company put up an 8.4 million dollar bond and a Singapore law firm appeared in court for the ship on July 20. The ship was formally released following the court appearance.⁹⁰

A launch chased the Lake Palourde as she steamed out of Singapore Harbor. France's charge d'affaires in Singapore, two lawyers hired by France, a High Court Baliff, and a policeman were on board the ship. France, like Britain, had issued a writ against Barracuda, feeling that she would be more likely to receive a judgment if Barracuda could be forced into posting another security bond. To arrest the ship a writ had to be affixed to any part of the tanker. The launch continued to chase the Lake Palourde as she picked up speed, but the pursuit ended unsuccessfully at the three mile limit.⁹¹

Barracuda's legal strategy came to light when a British subject sought to recover damages for harm done to plant and animal life on an English island he leased. Speaking for Barracuda, the firm of Conyers, Dill, and Pearman replied:

Our principals note the alleged extensive damage to Colonel Wooton's property by oil which it is claimed came from the Torrey Canyon. If

⁹⁰Ibid., p. 196.

⁹¹Ibid., p. 198.

this is in fact the case, the owners greatly regret the damage caused to animal life and to Colonel Wooton, and also any inconvenience and other nuisance alleged in your letter under reply.

We have been instructed to deny any responsibility for this damage, either past, present or future, for even if it can be substantiated that the oil came from the Torrey Canyon, the majority of the oil was released by the bombing of the ship by the British Government without the consent or connivance of the owners.⁹²

The following autumn in Singapore Barracuda answered the British charges that damages resulting from the grounding were due to the negligence of Barracuda and the ship's crew. At the same time Britain entered an alternative argument, charging the Torrey Canyon with creating a public nuisance. In reply, Barracuda admitted that the stranding resulted from navigation error on the part of the tanker's master, but maintained that negligible amounts of oil escaped before the bombing was undertaken. Barracuda's lawyers further maintained: without the bombing the oil would have remained in the ship's tanks, Britain's efforts to combat the oil by spending three million pounds surpassed the damage done by the oil, and because the bombing was an "Act of State," claims by Britain should be against Liberia.⁹³ Barracuda made it known through her lawyers that she would settle for the limitation fund, the maximum sum the shipowner was liable for under limitation-of-liability legislation.

⁹²Ibid., pp. 197-198.

⁹³Ibid., p. 199.

In addition to the British Government, France, the state Guernsey (a self-governing British dependent), British Petroleum and several individuals had begun proceedings against Barracuda, or would shortly do so. Thus, 3.2 million dollars, the maximum limitation fund for the Torrey Canyon under British law, would not go far in settling all these claims.

For unlimited liability to be allowed it is necessary to show that an owner has been negligent in a serious way. In the event that action against Barracuda failed, any move against Union Oil would be fruitless unless there was unlimited liability. Hopefully, liability could be demonstrated by establishing the absence of sailing directions for the Torrey Canyon. Page five of the Tanker Time Charter which gave Union Oil the use of the supertanker states: "The master shall be furnished by Charterer from time to time with all requisite instructions and sailing directions."⁹⁴

On April 1, 1968, France arrested the Lake Palourde in Rotterdam and forced her to post a 7.6 million dollar security bond before the President of Rotterdam's High Court. This action meant that France could now initiate a separate suit. By taking separate action France was hopeful that she would not have to share in Britain's liability fund.⁹⁵

⁹⁴Ibid., p. 201.

⁹⁵"Palourde Released in Netherlands," The Times [London], April 4, 1967, p. 4.

On September 19, 1967, Barracuda and Union Oil appeared in Federal District Court in New York to initiate an admiralty proceeding to allow exoneration from, or limitation of, liability. On September 22, Judge Frederick Bryan enjoined independent action against the companies and set the limitation fund at fifty dollars. Under United States maritime law liability is limited to what is recovered from a shipwreck. In the case of the Torrey Canyon this amounted to a lifeboat valued at fifty dollars.

Britain, France, and Guernsey asked the court to modify Judge Bryan's order by requesting that action be allowed against Union Oil and that liability be unlimited. Judge Charles Metzger turned down the first request and left the second question open until decided by trial.⁹⁶

In November, 1969, Union Oil and Barracuda Tanker agreed to pay 7.2 million dollars in damage for their responsibility in the accident. Britain and France each received 3.6 million dollars, 70 per cent of which was covered by insurance.⁹⁷ All together the disaster cost Great Britain, France, and the salvors about twenty-four million dollars. The compensation did not fully reimburse the costs of the accident. The two governments settled for about half of the amount they could have received if

⁹⁶Cowan, p. 202.

⁹⁷"Pollution--The Price of Disaster," Time, November 21, 1967, p. 59.

they had been successful on every legal issue.

The British Government received 25,000 pounds to cover losses and expenses caused by the pollution. Beyond that, additional legal liability would be shared between the British Government and the owners. The Attorney General described the settlements "as eminently fair and satisfactory to all parties, having regard to the difficulties of litigation that would have been necessary abroad."⁹⁸ Private claims had to be submitted before May 11, 1970, to the owner's solicitors, Ince and Company of London.

The British Government bore the bulk of the expenses, about 250,000 pounds for reimbursing local authorities and harbor and river boards for fighting pollution, 500,000 pounds for detergents, and 750,000 pounds for stocks and equipment used by the Ministry of Defense.⁹⁹

According to a Ministry of Housing and Local Government official local governments received about 80 per cent of their costs from the Government, with small authorities receiving a higher proportion.¹⁰⁰ The French Government seemed satisfied with the settlement and used their share to refund their outlays used in fighting the oil.

⁹⁸Frank Roberts, "3m pay-out on Torrey Canyon," The Times [London], November 12, 1969, p. 4.

⁹⁹Ibid.

¹⁰⁰Ibid.

On November 11, 1967, the Attorney General of Great Britain, Sir Elywyn Jones, issued a statement and answered questions concerning the Torrey Canyon settlement. He commented:

The owners denied liability and challenged the quantification of damages which the Governments estimated at about 6 million [pounds]. The sum of 3 million is thus virtually half of the maximum sum that might have been recovered if we had succeeded on every issue. The owners claimed to be entitled to limit their liability for damages to a sum based on the tonnage of the ship. Had this succeeded, the total amount available for all the claimants would have been only about 1 and three-quarters million pounds--and even that sum would have been available only if we had succeeded in establishing liability.

The owners have agreed to make available a sum up to a total of 25,000 pounds for the purpose of compensating these claimants in both countries.

Should any legal liability to British residents arise which falls outside the scope of these provisions--which I think is extremely unlikely--the Government and the owners have agreed to share it equally between them.

I am satisfied that, having regard to the uncertainties, inevitable delays, and expenses of litigation, which would have had to be conducted abroad, the complex and unique points of law involved in establishing legal liability, and, finally, the difficulties involved in quantifying and proving damages, this settlement is eminently fair and satisfactory to all parties.¹⁰¹

He concluded by stating that he believed that if the case had gone to trial several years later there would have been considerable difficulties. He emphasized that international

¹⁰¹"Remarks By U. K. Attorney General On Torrey Canyon Settlement," International Legal Materials, IX, 3 (May, 1970), p. 634.

action was absolutely vital.¹⁰²

The Biological Consequences of Crude Oil from the Torrey Canyon on Birds, Marine, and Intertidal Life

Pollution associated with the wreck of the Torrey Canyon may be summarized as follows:

The Torrey Canyon marine pollution was caused by crude oil released onto the surface of the sea and by non-ionic detergents used in the dispersal of the oil. Oil, although it killed several thousand sea birds, was recognized from the outset of the Torrey Canyon operations to be a pollutant mainly destructive of the amenities of shores and beaches; detergents, on the other hand, were known to be destructive of life.¹⁰³

From the beginning of the crisis administrative machinery was chiefly concerned with disposing of the oil because of the danger it posed to coastal recreational amenities, without adequately considering its effects on marine life. In Britain little regard was paid to conservationists who urged local officials to confine the use of detergents to the main holiday beaches. The improvement of the visual appearance of the beaches was given top priority because of the approach of the holiday season.

In Cornwall large stretches of the coastline between the Lizard and Trevose Head were heavily polluted, some beaches were knee-deep in thick oil. The initial attempts

¹⁰²Ibid., p. 635.

¹⁰³Smith, p. 176.

to clear the coast by local authorities were unorganized and haphazard. Detergent was sprayed or slopped from small boats close to the coast with little effect and detergent application to clean polluted beaches and rocks was initially inefficient and wasteful. Methods of dispersal included: spraying, dribbling out of hoses, pumping machines, pouring from watering cans and buckets, tipping out of drums, and upending drums from cliff tops. There was a lack of appreciation that application of detergent without subsequent water washing could be more harmful than not using detergents at all.¹⁰⁴

Northerly winds prevailed for nearly two months following the wreck, at a time of year when the wind normally blows from the southwest, thus blowing much oil out to sea that would have otherwise come ashore.

Two scientific reports dealt with the Torrey Canyon disaster. Sir Solly Zuckerman's Committee of Scientists was organized at the time of the disaster, and later issued a report on the accident. The other report, undertaken by the Plymouth Laboratory of the Marine Biological Association of the United Kingdom, was underwritten by the British Government, and dealt with the biological consequences of Torrey Canyon accident. This survey was based on a ten-week survey and analysis undertaken immediately following the

¹⁰⁴Angela Croome, "Oil from the Torrey Canyon," Sea Frontiers, XIV (May-June, 1968), p. 141.

grounding.

The Zuckerman Committee concluded that "most of the decisions taken during the crisis had a scientific and technical aspect."¹⁰⁵ The Committee decided that it was difficult to put counter-measures on a scientific footing because of a lack of relevant scientific information; the necessity to improvise a response to the emergency; and the legal, political and economic spectors raised by the incident. In summation the Committee reported.

In some respects we were lucky to have got off as light as we did. If the ship had grounded and then broken up in some other coastal area, for example in the shallow part of the North or Irish Seas, the problems raised and the damage caused could have been on a vastly greater scale than was actually experienced. A combination of shallow water, of less favorable tidal currents, and a greater degree of coastal confinement, would have increased the difficulties of dispersing the oil as well as the extent of pollution of the coastline and the danger to fisheries and wildlife. . . . It is a sobering thought that each thousand tons of crude oil discharged in a less favorable area than the Seven Stones Reef might thus have had consequences at least as serious as those which followed the spillage of the 95,000 tons or so from the Torrey Canyon.¹⁰⁶

Experiments with detergents by the Plymouth group revealed that some organisms are seriously affected by less than 1 ppm (part per million) of detergent, and that as concentration rises so do the effects and variety of species affected. At 10 ppm exposure for one hour was found lethal to most planktonic and sublittoral life. Although intertidal

¹⁰⁵Report of the Committee of Scientists, p. viii.

¹⁰⁶Ibid., p. 44.

animals were more tolerant, they were exposed to much higher levels of detergent concentrations.¹⁰⁷ Hundreds of different detergents, varying in their toxicity, were employed.

The Plymouth Laboratory found that most detergents were highly volatile in the open sea, but their toxicity rapidly diminished as the volatiles evaporated, and as they were mixed with the help of strong winds and deep water along Britain's southwest peninsula.¹⁰⁸ The deep water along the coast prevented any great loss of intertidal commercial shellfish which prefer shallower areas. Crabs and lobsters were further protected by the deep waters they favor during the spring period.

Observations by divers along the coast revealed that some conger eels, dabs, flounders, and eel elvers were killed inshore; but trawling uncovered little evidence of injury to commercial fisheries. A few lobsters and crabs were found dead in areas where detergents had been applied in large quantities.¹⁰⁹

The report concluded that detergents used away from shore were not noticeably injurious to marine life, with the exception of planktonic organisms which live in the oceans' extreme surface layer. The injurious effect spread to some degree to the sublittoral zone.¹¹⁰

¹⁰⁷Smith, pp. 148-149.

¹⁰⁸Ibid., p. 35.

¹⁰⁹Ibid., p. 37.

¹¹⁰Ibid., p. 174.

Approximately 10,000 tons of detergent were used to treat about 14,000 tons of crude oil that washed ashore the beaches as a water-in-oil emulsion to a milk-like oil-in-water emulsion to disperse it. Agitation of "treated" oil was considered very important for the promotion of dispersion.¹¹¹

Even though toxic non-ionic detergents were employed, the Plymouth survey was surprised to discover that although the oil resulted in the destruction of coastal amenities and the smothering of some organisms, many shore organisms could tolerate and often digest oil. Further, it was found that an organism's susceptibility to detergents was dependent upon the type of detergent used, its concentration, and the length of exposure.¹¹²

In rocky inshore areas where oil was not treated as it arrived the crude lost most of its toxic volatiles in a few days. Where the oil persisted in thick layers, however, it often smothered shore organisms by physical asphyxiation. Mortality was clearly detected among limpets, barnacles, mussels, algae, and the absence of crabs, shrimps, and shore fishes.¹¹³

The oil first arrived on sandy beaches in drifts

¹¹¹Ibid., p. 13.

¹¹²Ibid., pp. 14-15 and 29.

¹¹³Ibid., pp. 68 and 148.

from one-half to several inches thick. In some places the oil was simply scooped up, while in others the more common method of pushing or hosing the oil back into the sea was used. It was found that untreated oil in sandy areas seldom penetrated deeply into beach sands, while treated oil was discovered at considerable depths. Because sandy beaches contain limited life, there was limited damage to organisms. Natural degradation of the oil was encouraged by the exposed conditions of the Cornish coast which provided adequate aeration.¹¹⁴

The worst sufferers from the oil were seabirds. The heaviest casualties being among the diving birds: guillemots, razorbills, coromrants, and shags. Gulls seem to have learned to avoid oil. A decline has been noticed in the number of auks and other diving birds breeding on southern British coasts in the last thirty years--probably as the result of oil pollution. The wreck occurred during the spring migration season for birds, when millions were traveling from North Africa, the Iberian peninsula, and the Atlantic coast of southern France, to breeding areas in the British Isles. These seabirds traveled by an all-water route, with flight lines converging off the southwestern tip of Cornwall. Some species fly on, while many others spend time in these waters feeding and

¹¹⁴Ibid., pp. 76 and 90.

courting.¹¹⁵

Birds affected by oil that managed to reach the shore were in poor shape: their feathers were matted and scraggly, their throats and intestines burnt by oil or detergent, most were chilled, and they suffered from loss of appetite, shock, and exhaustion. The worst injuries among the birds were attributed to detergents. The Royal Society for the Prevention of Cruelty to Animals set up emergency centers along the coast, the largest being at the permanent bird haven at Mousehole. At the centers birds were washed, dried, and sent to inland sanctuaries to regain their buoyance. France set up similar bird hospitals. In the first week following the disaster 4,000 birds were taken to Mousehole. Most of these victims died: it is estimated that only one out of every 100 birds treated survived. By the middle of April 7, 849 birds had been picked up and taken to feeding stations.

The Plymouth survey concluded that when possible oil at sea should be treated by sinking, and that mechanical methods should be employed on shore. Detergents were found to be useful in emergency situations when used with discretion, because detergents disperse but do not destroy oil. Because detergent toxicity is mainly the result of their volatile aromatics, detergents with less toxic aromatics

¹¹⁵Gill, pp. 88-90.

should be developed. The best solution for the control of oceanic oil pollution was said to be the containment of the spillage at sea.¹¹⁶

In treating future oil spills it must be remembered that with the exception of seabirds oil is more an aesthetic pollutant than a biological one. Natural recovery should be used in preference to detergents whenever possible. Non-toxic detergents which will disperse oil but not destroy marine life are needed.¹¹⁷

The Plymouth report concluded by stating:

The Torrey Canyon disaster highlighted with an exceptional clarity the unpleasantness that can arise when materials essential to man's industrialized society escape from the confines of their intended use to foul the environment

We are progressively making a slum of nature and may eventually find that we are enjoying the benefit of science and industry under conditions which no civilized society should tolerate.¹¹⁸

In the final analysis man-applied detergent pollution proved more lethal to marine life than the accidental spillage of crude oil.

Conclusion

An analysis of the Torrey Canyon disaster reveals that scientists, politicians, the captain of the tanker,

¹¹⁶Smith, pp. 174-181.

¹¹⁷Wagner, p. 168.

¹¹⁸Smith, pp. 183-184.

and the owners of the ship all acted with various degrees of ignorance and lack of foresight.

The politicians had only a limited awareness of international law, and they reacted to some aspects of the crisis ineffectively. A history of the incident shows that the Wilson Government was initially hesitant to act against the stricken tanker because it was unsure what limitations international law placed on their actions. Later, however, a spokesman claimed that the Government had not even considered the status of international law before ordering the bombing of the ship. To a certain extent the Government must be excused for their failure to order the bombing of the ship earlier. Because of the inherent weaknesses of international sea law there were no provisions to cover the possibility that a ship might wreck in international waters and pollute the seas and shorelines of a sovereign state.

The Government also allowed salvage attempts to continue beyond the point where salvage was reasonably possible. Apparently English "civility" outweighed the practical considerations of controlling additional oil spillage.

There are several positive sides to the actions of the British Government. The Wilson Government acted with foresight in calling the Intergovernmental Maritime Consultative Organization into special session and announcing that

new international legislation was necessary to deal with Torrey Canyon type catastrophes. A positive step was also taken when the research of the Committee of Experts was underwritten. This Committee successfully chronicled the disaster, the methods undertaken to deal with it, and the scientific procedures that should be followed in handling future large-scale oil spills.

British scientists acted improperly when they suggested that detergents be used to treat the spillage. This action proved more harmful to the marine environment than untreated crude oil would have. Apparently those in the affected areas of Britain who profitted from recreational income had more political influence than others, such as fishermen, who derived their principal income directly from the sea. The detergent treated beaches had a clean appearance, but the chemicals used resulted in damage to living organisms. The French, whether acting out of ignorance or enlightenment, pursued a proper course of action by treating the oil that reached the coast of France solely by mechanical means.

Captain Rugiati, the Liberian Government, and the ship's owners all acted in a negligent and careless manner. The captain let a deadline for reaching port override the safety considerations involved in taking his ship through a dangerous passage. Further, he neglected to utilize

effectively the myriad of safety devices contained on the bridge of the ship. The Liberian Government conducted a "whitewash" investigation of the grounding in an apparent attempt to place the blame fully on Captain Rugiati, while trying to exonerate their Government from any responsibility for the disaster. The final report issued as a result of the hearing neglected to mention that the ship had encountered previous mechanical problems, or that it contained no sailing instruction for passing through the waters of the Scilly Isles. The owner's should have kept their supertanker in top shape and made sure that it contained the proper sailing guides.

The Torrey Canyon oil spillage was the result of an accidental spill, yet it served to awaken the world to the problems of oil pollution, while revealing the uncertainties and ambiguities of national and international law for dealing with oil spillage catastrophes. The problems associated with environmental sea law will be considered in the subsequent chapter.

CHAPTER IV

NATIONAL AND INTERNATIONAL LEGAL EFFORTS
TO DEAL WITH POLLUTION

Introduction

The Torrey Canyon disaster caused widespread concern over the inadequacy of national and international liability legislation to deal with oil pollution of the oceans. It also revealed the lack of national and international laws dealing with the preventive and restorative aspects of oil pollution.

Currently the burden of preventing and controlling oil spills rests with individual states. Their jurisdiction has generally been regarded as superior to the interstate system. Even on the high seas the state of a ship's registry has historically exercised the regulation, control, and enforcement of anti-pollution measures. Significantly, many states lack the resources to force compliance with national laws within their territorial seas.

State responsibility for extraterritorial damage to the territory of other states has been based on neighborhood, abuse of rights, and international servitudes,

principles inadequate to deal with the destruction of the seas in the twentieth century.¹

Major weaknesses exist in international pollution control agreements because they apply only to signatory states and there has been inadequate enforcement of their provisions.

In both national and international law there exists the problem of reconciling the interests of oil producers, carriers, and states with large tanker fleets; with those concerned with the prevention of oil pollution. The legal and political problems facing the oceans are tied closely to the myth of the "unfathomable seas." Long after it is an outmoded doctrine, the concept of res nullius often applies to the polluting of the seas.² The traditional doctrine of freedom of the seas has been based upon exploitative rights: freedom of navigation, freedom of fishing, freedom to lay submarine cable, and freedom to fly over the seas.

Traditionally international law has sought to protect general world interests through the operation of the international state system. Today, certain entities, such as the sea, need to be protected from the state system.

¹Robert Rienow, "Manifesto for the Sea," American Behavioral Scientist, XI, 6 (July, 1968), p. 34.

²Ibid.

For all states to share in the use of the seas increased co-ordination is needed between states and international organization.³ A decision must be made as to whether custom and established law prohibit the use of the seas for waste disposal. Or, in other words, is freedom of waste disposal recognized by customary international law? If not, it would seem that the right to use the high seas is a right of reasonable and responsible users.⁴

The Bering Sea Arbitration of 1893, which concluded that cruel and wasteful sealing was not malicious, upheld the concept of the absolute right of users to the sea's resources. The more recent Anglo-Norwegian Fisheries case, arbitrated in 1951, required reasonable and moderate use of the fisheries of the sea. Thus, it supported the argument for reasonable usage of fisheries.⁵

The Preamble to the 1958 General Convention on the High Seas recognizes that its provisions are "generally declaratory of established principles of international law." Article 2 of this Convention provides that the freedoms of the sea it specifies, and others, "which are recognized by the general principles of international law, shall be

³Michael Hardy, "International Control of Marine Pollution," Natural Resources Journal, XI, 2 (April, 1971), p. 300.

⁴E. D. Brown, "International Law and Marine Pollution: Radioactive Waste and 'Other Hazardous Substances'," Ibid., p. 222.

⁵Hardy, p. 300.

exercised by all States with reasonable regard to the interests of other States in their exercise of the freedom of the seas."⁶ This provision seems to prevent the unreasonable discharge of noxious substances into the sea.

Article 24 of this Convention states:

Every State shall draw up regulations for preventing pollution of the seas by the discharge of oil from ships or pipelines or resulting from the exploitation and exploration of the seabed and its subsoil taking account of existing treaty provisions on the subject.

Article 25, Paragraph 2 of the Convention calls on all States to:

. . . co-operate with the competent international organizations in taking measures for the prevention of pollution of the seas from the air and by activities involving radioactive materials or other harmful agents.

Article 5, Paragraph 1 of the 1958 Convention on the Continental Shelf requires:

The exploration of the Continental Shelf and the exploitation of its natural resources must not result in any unjustifiable interference with navigation, fishing or the conservation of the living resources of the sea, nor result in any interference with fundamental oceanographic or other scientific research carried out with the intention of open publication.⁷

Paragraph 7 requires that:

The coastal State is obliged to undertake, in the safety zones (around installations or devices on the Continental Shelf), all

⁶"Convention on the High Seas," p. 842.

⁷"Convention on the Continental Shelf," p. 859.

appropriate measures for the protection of the living resources of the sea from harmful agents.

The problem of oceanic pollution by oil will have to be dealt with in four areas: national, treaty, technological, and international. Hopefully, it will increasingly fall to international organizations, treaties, and regional bodies to cope with the problems arising from man's misuse of technology.

The irony is that man, who is the source of the poisoning of the sea, must now contend with the threats posed by that pollution. Any new manifesto for the sea must consider the ecological realities of the total oceanic pollution problem, legal liabilities, and the balancing of continued and increased use of the sea's resources against the need to prevent pollution. Legal remedies for the control of oil pollution must meet four goals: 1) limiting or prohibiting the intentional discharge of oil, 2) preventing accidents involving oil spillage, 3) dealing with the problem of oil on and in the sea, and 4) imposing liability for oil pollution.⁸

Regulation of Oil Pollution by Municipal Law

Many states have municipal laws dealing with the pollution of their territorial sea. Some of these acts concern pollutants in general, while others deal with oil in

⁸Schacter and Serwer, p. 92.

particular. Many contain provisions that allow discharges of toxic materials for the protection of lives, ships, or Acts of God.⁹ The penalties provided for violation of these acts are generally inadequate for dealing with today's supertankers. Many of these statutes were enacted as enabling legislation for the 1954 international convention on oil pollution. In light of their inadequacies it is easy to understand why international pollution conventions have lacked adequate enforcement and penalties.

The first United States federal law dealing with pollution of waters was enacted in 1886 and prohibited pollution of New York Harbor. Further legislation passed in 1890, 1894, and 1899 culminated in the River and Harbor Act which prohibited pollution, accidental or deliberate, in all navigable waters of the United States.¹⁰

The Oil Pollution Act of 1924 made illegal the discharge of oil into the streams and territorial waters of the United States by any ship using oil as fuel, carrying petroleum, or having oil in excess of that needed for lubrication.¹¹ The statute prevented willful and accidental

⁹National Legislation and Treaties Relating To The Territorial Sea, The Contiguous Zone, The Continental Shelf, The High Seas And To Fishing and Conservation Of The Living Resources Of The Sea (United Nations: New York, 1970), pp. 417-567.

¹⁰Archie Hovansen Jr., "Post Torrey Canyon: Toward a New Solution to the Problem of Traumatic Oil Spillage," Connecticut Law Review, II, 3 (Spring, 1970), p. 635.

¹¹Robert and Leona Rienow, p. 112.

oily discharges by tankers within the U. S. three-mile limit. The shipowner had to show that the discharges resulted from the emergency saving of life or property or due to inevitable accident. Penalties were punishable by a fine of from \$500 to \$2,500, imprisonment for thirty days to one year, or procedure against the vessel in rem.¹²

Legislation passed in 1966 implemented the 1954 International Convention for the Prevention of Pollution of the Sea by Oil. The Clean Waters Restoration Act of 1966 requires those discharging oil from vessels in United States navigable waters to remove oil, or face penalties.¹³ The statute had little effect because it was limited to situations where the discharge was caused by gross negligence or willful acts.

On May 26, 1967, President Johnson ordered two cabinet officers, the Secretary of Interior, Stewart Udall, and the Secretary of Transportation, Alan Boyd, to look into the problem of oil pollution. A Senate Committee on public works also held hearings on measures to avoid and fight water pollution. In its report to the Senate the Committee concluded:

¹²Peter N. Swan, "International and National Approaches to Oil Pollution Responsibility: An Emergency Regime for a Global Problem," Oregon Law Review, L, 3 (Spring, 1971), pp. 510-511.

¹³Ved P. Nanda, "The Torrey Canyon Disaster: Some Legal Aspects," Denver Law Journal, XLIV, 3 (Summer, 1967), p. 412.

Of the various threats to our environment from oil pollution, the most serious occurs during transport of oil. This included movement, loading, unloading, transfer, and cleanup. It included bulk movement by vessels, river, and lake barges, pipelines, road and rail tank cars, terminals, pump stations, and bulk marketing. Accidents, poor maintenance, carelessness, shortcutting and cleanup operations, the apparatus and the methods used all contribute to the problem.¹⁴

The United States Water Quality Act of 1970 provides for absolute liability for clean-up up to 100 dollars per gross ton, with a limit of fourteen million dollars for any one incident, except in cases of Acts of God, acts of war, United States Government negligence, or acts of third parties. If the discharge is shown to result from negligence, the owner or operator of a ship will be held responsible for all clean-up costs. Even this act fails to provide legal recourse for private interests injured by the oil, although private individual suits may be brought for the recovery of damages.¹⁵ Sadly, discharges are allowed in the contiguous zone when permitted by the 1954 oil pollution convention. This includes escape of oil from damage or unavoidable leakage.

On January 8, 1971, President Nixon signed a bill giving supplemental appropriations to the Environmental

¹⁴Cowan, p. 220.

¹⁵Henry J. McGurran, "The Externalities of A Torrey Canyon Situation: An Impetus For Change in Legislation," Natural Resources Journal, XI, 2 (April, 1971), pp. 370-372.

Protection Agency to research the problem of oil pollution effects.¹⁶ Mr. Ruckelshaus, the director of the Environmental Protection Agency, made the following statements about oil pollution laws:

The law imposes penalties for willful negligence that results in oil pollution, as well as holding parties liable for cleanup costs. In the area of willful and accidental spills, the record set by oil tankers, operators of off-shore drilling rigs, and industries is far from commendable. In fact, on the basis of the number of oil-pollution mishaps that despoil our beaches and harbors each week, that record can best be described as shameful.¹⁷

In cooperation with the Coast Guard, the Corps of Engineers and other agencies, the Federal Water Pollution Control Administration can now act to prevent pollution, impose penalties, take the steps necessary to clean polluted beaches, and recover the cost of such operations from the polluters. This act allows the federal government to act for state or local governments that may suffer damage.¹⁸

All United States laws dealing with pollution rely on penalties as a means of enforcement. To be implemented successfully penalties will have to be large enough so that the economic benefits derived from pollution rely on penalties as a means of enforcement. They will also have to be large enough so that the economic benefits derived from

¹⁶"Growing Problems of Oil Spills--Reasons and Remedies," U.S. News and World Report, February 8, 1971, p. 52.

¹⁷Ibid., p. 53.

¹⁸"Tarfoot," New Republic, April 29, 1967, p. 5.

pollution are less than the penalties associated with polluting.¹⁹ Additionally, a large-scale monitoring system would be necessary to arrest a reasonable percentage of violators.

When cases reach the courts, judges have encountered difficulty determining when an incident is sufficiently unavoidable to avoid liability. It is interesting to note that under United States law, hull insurance goes to the owner free of lien of judgment, and is not part of the limitation fund reserve in polluting incidents.

In the case of Petition of New Jersey Barging Corporation (1958), damages were allowed for the nuisance caused by an oil slick. The slick was found to be responsible for damage done to onshore property.²⁰ In the case of Hugglund v. United States (1938), the liability of a ship's master was affirmed because there was reason to expect oil would escape through leaks in the ship below the waterline, due to several previous incidents where this occurred.²¹

Early oil pollution controls were carried out by the United Kingdom in 1922 when oil discharge was prohibited in British territorial waters. Other countries followed suit with varying success.

¹⁹McGurren, pp. 358-359.

²⁰Nanda, p. 417.

²¹"Oil Pollution On The Sea," Harvard International Law Journal, X, 2 (Spring, 1969), p. 340.

Britain's Oil in Navigable Waters Acts of 1955 and 1963, and her Continental Shelf Act of 1964, make the discharge of oil punishable, with few exceptions. Under these acts it is an offence to dump oil even in emergency situations if the owner or master of the vessel causing the harm did not report their actions to harbor authorities.²²

In the case of Southport Corporation v. Esso Petroleum Company (1953), it was ruled that negligence was not proven when a stranded tanker dumped over 400 tons of oil overboard to save the vessel and crew from danger. In another case, however, that of Miller Steamship Company Pty. v. Overseas Tankship (1963), the presence of a large amount of oil in a harbor was found to constitute a public nuisance.²³ Interestingly, Britain has no statutes specifically governing civil liability for oil spills.

The Problem of Liability

The various international agreements concerned with oil pollution have inadequately considered the problem of liability. The 7.2 million dollars that France and Great Britain received for damages caused by the Torrey Canyon resulted from voluntary settlement rather than legal processes.²⁴ Liability for discharging oil into water is

²²Nanda, pp. 414-415.

²³Ibid.

²⁴Robert W. Deutsch, "Oil On The Water," The New Republic, February 28, 1970, p. 10.

covered by three types of laws: 1) international conventions and implementing legislation enacted by contracting states, 2) municipal oil pollution statutes, and 3) common law.²⁵

Insurance is a necessity for tanker companies as claims for oil damages are limited to recovering to the extent of a polluter's assets. Thus, companies with only one ship, which may lie at the bottom of the ocean, or with other assets not located within the jurisdiction of a state harmed by pollution, would incur negligible penalties.²⁶

The liability articles of international pollution conventions have usually been based on fault. Tanker owners and operators and their insurers have always lobbied in favor of minimal liability.

The Maritime Law Association has argued that "it is rooted in the universally recognized principle that it is of paramount consideration for maritime nations to preserve the continuity of maritime commerce as a matter of national interest."²⁷ To support their case for limitation of liability they cite the fact that the United States Congress granted limitation of liability in 1861, and an 1871 Supreme Court decision which stated that the law's object was to

²⁵Nanda, p. 413.

²⁶McGurren, pp. 360-363.

²⁷Cowan, "Mankinds's Fouled Nest," p. 307.

entice capitalists to invest in ships.

The association fails to note that in early periods investors were responsible for damages caused by their ships and that today a large maritime insurance business provides liability insurance. It appears that the cries for "limitation of liability" are unnecessary for the economic health of supertanker owners.²⁸

If no price tag is placed on the damages resulting from oil spilled at sea by tankers, an overproduction and consumption of oil will result. Over-consumption will result because the cost of the risk associated with oil transportation by tanker will not be fully accounted for. It is reasonable to assume shippers will do little to curb oil pollution if they are not held responsible for reasonable damages and clean-up costs associated with oil spillage.²⁹

If shippers of oil are not required to allocate resources to insure themselves against reasonable damages that may occur, the costs of polluting will be less than the economic gains associated with polluting. This, in turn, would result in a misallocation of resources and result in costs to society greater than the cost of damages.³⁰

²⁸Ibid., p. 307.

²⁹McGurren, pp. 351-352.

³⁰Ibid., pp. 353-355.

Ideally, liability would extend to the point where the costs of a polluting incident is equal to the costs of clean-up.

The concept of absolute liability has already been made a requirement for the nuclear ships of signatory nations under the 1962 Convention on the Liability of Operators of Nuclear Ships. This agreement states:

The operator of a nuclear ship shall be absolutely liable for any nuclear damage upon proof that such damage has been caused by a nuclear incident involving nuclear fuel, or radioactive products of waste produced in such ships.³¹

In 1966 the United States Congress passed the Disaster Relief Act which stated that it was designed

. . . to provide an orderly and continuing means of assistance by the Federal Government to State and local governments in carrying out their responsibilities to alleviate suffering and damage resulting from major disasters³²

Under the provisions of this legislation once an area is designated as a disaster area the Government will assist with money, men, and machinery, to the limit of its ability. People's ability to repay clean-up costs will determine the reimbursement recoverable by the Government. The law is designed to offer quick aid and get people back on their feet quickly.³³ A similar type of convention would be beneficial

³¹Ibid., p. 367.

³²Hovansen, p. 644.

³³Ibid.

on the international level.

The Development of IMCO

The United Nations Maritime Conference was convened under the auspices of the Economic and Social Council of the United Nations as the result of a resolution adopted on March 28, 1947. The resolution requested the Secretary General to call a conference of interested governments to consider establishing an inter-governmental maritime organization. The Draft Convention, prepared by the United Maritime Consultative Council on the scope and purpose of the proposed organization, served as the basis for the Conference.³⁴

The Conference met in Geneva from February 19, to March 6, 1948. Thirty-two states sent delegations, four sent observers, five intergovernmental organizations attended, and four non-governmental organizations were represented. The Convention on the Intergovernmental Maritime Consultative Organization (IMCO) was signed as a result of the Conference.

Annex A to this Convention established a Preparatory Committee of twelve states to prepare an agenda for the first meeting of IMCO, and to establish a relationship with the United Nations. IMCO was established as a specialized agency under Article 57 of the United Nations Charter.

³⁴United Nations, Treaty Series, Treaties and International Agreements Registered or Filed and Reported with the Secretariat of the United Nations, CCLXXXIX (1958), 4214, "Final Act of the United Nations Maritime Conference (with annexes)," March, 1948, p. 8.

Annex B recommended that the Safety of Life at Sea Conference draft provisions in its final convention to consider the "duties and functions" accorded to IMCO.

The 63-article treaty was signed at Geneva on March 6, 1948, and came into force on March 17, 1958, when twenty-one states became parties to the agreement.³⁵

Part I, Article of the Convention outlined the purpose of IMCO:

- a) to provide machinery for co-operation among Governments in the field of governmental regulation and practice relating to technical matters of all kinds affecting shipping engaged in international trade, and to encourage the general adoption on the highest practicable standards in matters concerning maritime safety and efficiency of navigation;
- b) to encourage the removal of discriminatory action and unnecessary restrictions by Governments affecting shipping engaged in international commerce of the world without discrimination; assistance and encouragement given by a Government for the development of its national shipping and for purposes of security does not in itself constitute discrimination, provided that such assistance and encouragement is not based on measures designed to restrict the freedom of shipping of all flags to take part in international trade

Article 29 of this Convention defines the Maritime Safety Committee and its duties:

- a) The Maritime Safety Committee shall have the duty of considering any matter within the scope of the Organization and concerned with aids to navigation,

³⁵United Nations, Treaty Series, Treaties and International Agreements Registered or Filed and Reported with the Secretariat of the United Nations, CCLXXXIX (1958), 4215, "Convention on the International Maritime Consultative Organization," March, 1948, p. 48.

construction, and equipment of vessels, manning from a safety standpoint, rules for the prevention of collisions, handling of dangerous cargoes, maritime safety procedures and requirements, hydrographic information, log-books and navigational records, marine casualty investigation, salvage and rescue, and any other matters directly affecting maritime safety.

- b) The Maritime Safety Committee shall provide machinery for performing any duties assigned to it by the Convention, or by the Assembly, or any duty within the scope of this Article which may be assigned to it by any other intergovernmental instrument.
- c) . . . the Maritime Safety Committee shall have the duty of maintaining such close relationship with other intergovernmental bodies concerned with transportation and communications as may further the object of the Organization in promoting maritime safety and facilitates the coordination of activities in the fields of shipping, aviation, telecommunications, and meteorology with respect to safety and rescue.

The Intergovernmental Maritime Consultative Organization, which is permanently headquartered in London, attempts to do for the sea what the International Civil Aviation Organization does for aviation. It is a consultative and advisory body that formulates safety rules, fights discrimination and restriction of the seas, and attempts to find international cooperation on shipping matters.

IMCO meets in regular session every two years. IMCO's Council is composed of sixteen states: eight of the main consumer nations of shipping, and eight of the main providers of international shipping. The Council deals with all matters that arise during the period when the organization is not in regular session.

Although IMCO can make recommendations and sponsor international conventions, it cannot enforce rules itself. Broad questions of international law have not been considered because governments have failed to surrender requisite amounts of sovereignty.

During the first ten years of its existence IMCO was generally inactive in the field of oil pollution, with the exception of the 1954 and 1957 conventions. It is hard to understand this inaction in light of the fact that the United Nations has clearly given the organization the responsibility for dealing with marine pollution arising from maritime commerce. The Torrey Canyon disaster ended this inactivity. IMCO was called into special session in London shortly after the disaster, and later, in Brussels, the organization formulated two conventions dealing with oil pollution from ships. IMCO feared that the United Nations Conference of Trade and Development, the underdeveloped nations caucus on economic matters within the United Nations, threatened to enter the maritime field in order to expand its influence. A foray into international law would buttress IMCO's image.

At a conference scheduled for 1973, IMCO will consider: revisions of its 1954 convention on oil pollution, agreements to eliminate intentional pollution by substances other than oil, provisions for the safe transportation of dangerous goods, and measures for the disposal or treatment of ship-generated waste.

International Oil Pollution Conventions

Ship-generated oil pollution became a pollution problem as oil gradually replaced coal as ship's fuel, as the growth in the automobile industry resulted in increased demand for oil, and as oil was used to meet increased energy requirements in other areas.

Attempts to deal with oil pollution in the 1920's was hindered by the failure of the world to understand the scope of the problem and by the willingness of most states to rely on unilateral pollution control. In 1922 the United States Congress requested the President to call an oil pollution conference. The resulting Preliminary Conference on Oil Pollution of Navigable Waters finally met in Washington in 1926. At this time the United States favored widespread action to prevent pollution. The modest convention produced from the efforts of this Conference failed to gain ratification. The Convention would have allowed states to develop zones of up to fifty miles in which oil discharge would be prohibited. A United States proposal to ban all dumping was defeated by a two-to-one margin.³⁶

Following this meeting no international action was taken until after World War II. In 1935 a League of Nations conference on oil pollution proved fruitless in developing new rules governing oil pollution at sea.

³⁶Hardy, p. 323.

In 1952 Great Britain's Minister of Transport appointed a committee to consider the problem of oil pollution. In its report this committee recommended that the discharge of oily residues at sea should be prohibited or minimized over a wide area. As a follow-up, the British Government convened a conference under IMCO sponsorship, which met from April 26 to May 12, 1954, and resulted in the signing of the Convention for the Prevention of Pollution of the Sea by Oil.

This Convention came into force on July 26, 1958, twelve months after ten governments had become parties to the agreement. These ten, as specified by the Convention, included five states with not less than 500,000 tons of tanker tonnage.³⁷

The agreement prevents the discharge of oily substances by tankers of more than 500 gross tons of any oil effluents containing more than 100 parts of oil per 1,000,000 parts of mixture. Three years after the treaty came into force it was to apply to most other ships. The owner or master of the offending ship are held responsible for breaking the pact. Punishment is to occur in the state of the vessel's registry.

Discharge of oil is allowed in the following circumstances: in hazardous situations, due to damage or unavoidable

³⁷United Nations, Treaty Series, Treaties and International Agreements Registered or Filed and Reported with the Secretariat of the United Nations, CCXXVII (1959), 4714, "International Convention for the Prevention of Pollution of the Sea by Oil, 1954, May 12, 1954, p. 4.

leakage, when sediment cannot be pumped into cargo tanks due to their sedimentation, or when a discharge results from the purification or clarification of fuel or crude oil. Any discharge occurring in international waters is punishable by penalties as severe as those imposed under the law of the flag state for the pollution of its territorial waters.

All ships bound by the Convention are to carry oil record books to record the discharge of oily wastes. Such ships are compelled to surrender this book to proper authorities in the port of a contracting party upon demand.

Disputes between contracting governments relating to interpretation or application of the Convention which cannot be settled by negotiations are to be referred to the International Court of Justice for arbitration.

Three years following the entry into force of the treaty contracting parties were to ensure that a main port in their territory contained adequate facilities for the reception, without undue delay, of oily residues from ships other than tankers.

One year following the activation of the Convention, all ships registered in contracting states had to be fitted to prevent the discharge of oily residues into the sea which had not passed through an oil-water separator.

Annex A to the agreement established prohibited zones for the dumping of oily wastes within fifty miles of land. Various exceptions extended or decreased the area

of the prohibited zones in certain areas of the globe.

Most signatories to this 1954 treaty passed municipal legislation to implement the provisions of the agreement.

The Intergovernmental Maritime Consultative Organization announced in June of 1966 that the majority of the amendments to the pact, adopted by a 1962 meeting, would come into force in twelve months. Iceland was the twenty-first nation to accept the amendments, bringing the total acceptances to the required 2/3's of the governments contracting to the 1954 agreement.³⁸ These amendments officially came into force during May and June of 1967.

The main amendment prevents oily discharge from a ship of 20,000 gross tons or more to which the Convention applies. Discharges are allowed in special circumstance outside the prohibited zone.³⁹ A loop-hole allows tankers to discharge ballast from cleaned cargo tanks as long as the discharge leaves no visible traces of oil on the water's surface. However, many toxic oil ingredients are invisible.

Another amendment extends jurisdiction to registered or unregistered vessels having the nationality of a contracting party. Tankers under 150 gross tons and other ships under 500 gross tons were exempted.

³⁸"International Maritime Consultative Organization," International Organization, XX, 4 (Autumn, 1966), p. 833.

³⁹United Nations, Treaty Series, Treaties and International Agreements Registered or Filed and Reported with the Secretariat of the United Nations, DC (1967), 4714, "International Convention for the Prevention of Pollution of the Sea by Oil, 1954," 1969, p. 336.

A further amendment prevents oily discharges from ships, other than tankers, except when all of the following conditions are met: 1) the ship is enroute, 2) the rate of discharge of oil does not exceed sixty liters per mile, 3) the oil content of the discharge is less than 100 parts per million parts of discharge, and 4) the discharge is made as far as possible from land.

The amended treaty forbids the discharge of oil closer than 100 miles from heavily traveled coasts, while forbidding discharge into the North and Baltic Seas. The treaty now applies to small tankers and requires better storage facilities for oil wastes.

The original fifty mile prohibited zones were apparently selected not for scientific reasons, but because it represented a compromise. The limit extended out into the sea without unduly hindering the tankers in their operations. Where the 100 mile limit applies, it represents the political success of those who favor stronger pollution control.⁴⁰

Many new prohibited zones added by the amendments, such as those in the Mediterranean Sea, Red Sea, and Persian Gulf, as well as in waters near India and Madagascar, were prepared with the expectation that new shipping routes would soon be using these areas.

⁴⁰Robert and Leona Rienow, p. 114.

The effectiveness of the original 1954 agreement, as well as its amended version has been limited. The size of the prohibited zones makes detection difficult and even when ships are caught, enforcement is left to flag states of offending ships. The penalties of the flag state of the ship are often minimal.

Enforcement is further complicated because it is difficult to determine how much oil was discharged, as well as the distance over which it was dismissed. As is the case with all treaties of this nature, the central problem lies in the area of enforcement. Although tankers of contracting states are required to keep a record book of all discharges sent overboard, it is a simple matter to falsify such reports. As a coastguardsman remarked: "If motorists were given books, would you expect them to record every time they broke the speed limit or ran a stop sign?" He added: "You know, I've never seen a self-incriminating oil book."⁴¹

If all major maritime states were signatories to this treaty, and if its prohibitions were enforced, coastal states would be significantly protected from oil pollution. Future strengthening of this document will probably result from improving the supervision of compliance, rather than

⁴¹Ibid.

with extending prohibitions.⁴²

At an IMCO conference in Brussels in 1957, the International Convention relating to the Limitation of the Liability of Owners of Seagoing Ships was legislated. While the U.S. did not ratify or adhere to the Convention, it reflects the law of most of the other major maritime powers. It sets a liability limit of \$67 per adjusted net ton of ship. Limitation is denied when the accident results from the fault or privity of the owner. When claims exceed the limit, and the owner has set up a limitation fund, claims against other assets are not valid.⁴³

The agreements just discussed were the main international legislation prohibiting the oil pollution of the sea in existence when the Torrey Canyon ran aground.

The grounding of the Torrey Canyon resulted in an emergency meeting of IMCO in London, followed by a gathering in Brussels the following year for the purpose of developing international agreements to govern Torrey Canyon type situations. Two conventions resulted from the Brussels meeting: The Convention on Intervention on the High Seas in Cases of Oil Pollution Casualties, and the Convention on Civil Liability for Oil Pollution Damage.

⁴²Albert W. Koers as quoted in Schachter and Serwer, p. 93.

⁴³Swan, pp. 508-509.

The Convention on Intervention on the High Seas in Cases of Oil Pollution Casualties, the public law convention, codifies England's precedent of bombing the Torrey Canyon on the high seas. This Convention states that parties to it

. . . may take such measures on the high seas as may be necessary to prevent, mitigate or eliminate grave and imminent danger to their coastline or related interests from pollution or threat of pollution of the sea by oil, following upon a maritime casualty or acts related to such a casualty, which may reasonably be expected to result in major harmful consequences.⁴⁴

Before acting the coastal state affected must confer with the flag state of the ship involved, as well as notify those whose interests may be affected. The state involved is encouraged to call in experts recommended by IMCO. A state may act without consulting other interested parties in cases of extreme urgency. These measures must be communicated to IMCO, and are to be proportionate to the danger presented. Compensation is to be provided by the insulting party if the measures undertaken prove to be unreasonable. Disputes on this matter are to be submitted to a conciliation commission, and then to an arbitration board if the conciliation commission fails to reach an acceptable decision.

⁴⁴"International Convention Relating to Intervention On the High Seas in Cases of Oil Pollution Casualties. Done at Brussels on 29 November 1969," p. 471.

The Convention on Civil Liability for Oil Pollution Damage provides that the owner of a ship involved in a pollution incident is usually liable for pollution damage caused within the territory of a state contracting to the agreement. Liability extends to the cost of preventive measures. For any single incident of pollution an upper limit of liability is set at \$134 per ton, with a maximum of \$14 million.⁴⁵ In order to receive the benefits of limitation of liability the shipowner must deposit the proper sum, or a guarantee, with a court or other competent authority if action is brought under the terms of the Convention. This fund is to be distributed proportionately among the claimants.

Ships carrying 2,000 tons of oil as bulk cargo and registered in a contracting state must maintain insurance or other security up to the limit of liability for the size of their ship. A certificate to this effect must be carried on the ship. Further, contracting states must ensure that ships registered in any state carry insurance or security when entering or leaving their ports or terminals. Legal action may be brought within certain periods in the courts of contracting states where pollution damage occurs, or in contracting states who were forced to undertake preventive measures.

⁴⁵"International Convention on Civil Liability for Oil Pollution Damage. Done at Brussels on 29 November 1969", pp. 174-175.

The Convention of Civil Liability for Oil Pollution Damage has been criticized for various reasons. One writer stated: "Measured against the immediate and future threat of oil to the marine environment, the liability provisions of the proposed Convention are a scandalous concession to the marine and oil industries."⁴⁶

The \$134 per ton and the \$14 million maximum covers liability only up to 100,000 tons, thus freeing tankers larger than 100,000 tons from additional liability. Traditionally, the marine insurers have stated that they are unable to underwrite high limit policies. In an August 20, 1969, letter to Senator Jennings Randolph, Chairman of the Senate Public Works Committee in the United States Senate, fourteen leading maritime insurers claimed that insurance above ten million dollars was not obtainable. However, within two months they unaccountably insured a ship for \$14 million.⁴⁷ It does not seem unreasonable for super-tanker owners and the oil industry to insure tankers adequately.

This Convention prevents absolute liability for acts of God, war, or third parties. It fails to protect third parties who may be injured by oil released under the above circumstances. It is interesting to note that in international

⁴⁶Stephen Solomon, "Somebody Fouled Up," New Republic, October 31, 1970, p. 22.

⁴⁷Ibid., p. 22.

air transportation absolute liability is the rule. The agreement further limits enforcement to vessels actually carrying oil in bulk as cargo, which exempts other ships which undertake casual pollution, but which do not carry oil as cargo. Ships that dump non-oil toxic substances into the sea are not covered.⁴⁸

The progressive elements of this Convention include: strict financial responsibility, the extension of national jurisdiction to the high seas in oil pollution damages, and a prohibition of non-signatory nations from trading in the ports of signatory nations.⁴⁹

The two Torrey Canyon conventions offer only indirect means of controlling pollutants because they may only be enforced after accidents have occurred, or when they appear imminent.⁵⁰

Two resolutions were also adopted at the Brussels Conference. Resolution one concluded:

The only entirely effective method known of preventing oil pollution is the complete avoidance of discharge of persistent oils into the sea, and, as stated above, measures are now available which would enable this to be substantially achieved.

While the Conference has come to the conclusion that a date cannot be fixed at the present time by which there should be complete avoidance of the discharge of these persistent oils should, with certain necessary exceptions, be observed from

⁴⁸Ibid.

⁴⁹Ibid.

⁵⁰Ibid.

the earliest practicable date and strongly urge all governments and other bodies concerned to use their best endeavors to create the conditions upon which the observance of such a prohibition necessarily depends by securing the provision of adequate facilities in their ports and the necessary arrangements in ships.⁵¹

The second Resolution deals with the proposal made to set up an international fund to guarantee adequate compensation is available to third parties, even if no liability exists under the present convention, or where the compensation available under the Convention is inadequate to cover damages. IMCO was requested to draw up a draft treaty dealing with such compensation.⁵²

Neither of the Torrey Canyon Conventions have come into force due to the failure of the necessary number of nations to ratify them.

Pursuant to the second resolution adopted by the Conference a treaty entitled the International Convention on the Establishment of an International Fund for Compensation for Oil Pollution Damages was signed at Brussels on December 18, 1971. Article 2 of this agreement sets up an international fund with the following aims:

. . . to provide compensation for pollution damage to the extent that the protection afforded by the Liability Convention is inadequate;

⁵¹"Oil Pollution of the Sea," p. 329.

⁵²"Resolution adopted by the Conference on establishment of an international compensation fund for oil pollution damage, United Nations Juridical Yearbook, 1969, p. 181

. . . to give relief to shipowners in respect of the additional financial burden imposed on them by the Liability Convention, such relief being subject to conditions designed to insure compliance with safety at sea and other conventions . . .

The Fund shall in each Contracting State be recognized as a legal person capable under the laws of that of assuming rights and obligations and of being party in legal proceedings before the courts of that state. Each Contracting State shall recognize the Directory of the Fund as the legal representative of the Fund.⁵³

Article 3 stipulates that the Convention applies "to pollution damage caused on the territory, including the territorial sea of a Contracting State, and to preventive measures taken to prevent or minimize such damage."

Article 4 provides that the fund is payable to any person who has suffered pollution damage and has not received adequate compensation or damage under the International Liability Convention of 1969 because no liability for the damage arises under the agreement, or the owners are unable to provide full compensation under the treaty. In most cases liability is not to exceed 450 million francs for any one incident, and 450 million francs in cases of exceptional natural phenomenon.

Under Article 10 contributions to the fund shall be made by any person who has received more than 150,000 tons of oil by tanker. Contributions are to be calculated on

⁵³"International Convention on the Establishment of an International Fund for Compensation for Oil Pollution Damage," p. 714.

the basis of a fixed sum for each ton of oil received. The sum to be paid shall be determined by the Assembly set up by the Convention. Initial contributions shall be made on the assumption that 90 per cent of the oil carried by sea in the world would amount to a payment of 75 million francs. All contracting states are to ensure that any person who received oil in amounts which make him liable for contributions to the fund appear on an up-to-date list of those liable for contributions.

Although international conventions dealing with oil pollution have had limited impact, nevertheless they provide an opportunity for free discussion to occur between shipbuilders, oil companies, biologists, administrators, and politicians. The existing conventions have shown that despite enormous difficulties it is possible to reach limited agreements under international law.⁵⁴

Actions of Other International Bodies

United Nations members have made it known through recent General Assembly resolutions, and in the Intergovernmental Working Group of Marine Pollution, established by IMCO's preparatory committee, that there is concern with marine pollution on the international level. However, it seems evident, in light of international conventions, and

⁵⁴Jean Dorst, Before Nature Dies (Baltimore: Penguin Books, 1971), p. 206.

the work of international organizations, that their efforts have been inadequate to deal with Torrey Canyon situations.

In the fall of 1967, Arthur Goldberg, the United States delegate to the United Nations, made the following statement about the sea before a meeting of the General Assembly:

Though man has traveled and fished on the sea for many centuries this portion of the earth remains in many respects as strange and unknown to us as that other vast and little-explored realm of outer space.

If anarchy in the sea continued, the maritime powers will be tempted to extend claims of sovereignty beyond the continental shelf.⁵⁵

In September 1969, the Intergovernmental Oceanographic Commission adopted a "Comprehensive Outline of the Scope of the Long-Term and Expanded Program of Oceanographic Exploration and Research" (LEPOR). This outline was prepared at the request of the General Assembly of the United Nations. Part of this outline contains proposals for scientific undertakings which will lead to the preparation of reports on the health of the ocean and to a forecasting system to undertake measures to deal with undesirable effects that are detected.⁵⁶

On December 13, 1969, the General Assembly formulated a resolution for Promoting Effective Measures for the Prevention and Control of Marine Pollution which requested the

⁵⁵Clark M. Eichelberger, "The U.N. and the Sea," Saturday Review, October 14, 1967, p. 22.

⁵⁶E. D. Brown, p. 238.

Secretary-General, in co-operation with the concerned specialized agencies and intergovernmental organizations, to include several reviews in their reports for the United Nations Conference on the Human Environment. These included: a review of harmful chemical and radioactive materials which could affect man in his relationship to the marine environment and coastal areas; a review of the work of national, intergovernmental, and specialized agencies in dealing with, preventing, and controlling marine pollution; and a report on the views of member states on the desirability and feasibility of international treaties on the marine environment.⁵⁷

Several world-wide bodies are concerned with the environmental problems of the oceans. The Intergovernmental Oceanographic Commission (IOC), in collaboration with UNESCO, is dealing with the functions of monitoring, evaluating, researching, educating, and training on environmental questions. In an effort to avoid duplicity the United Nations agencies FAO, UNESCO, WHO, IMCO, and IAEA, have formed the Joint Group of Experts on the Scientific Aspects of Marine Pollution (GESAMP). The organization is administered by IMCO. As part of its work GESAMP is dealing with pollution resulting from the exploitation of the sea-bed, with promoting measures for preventing and controlling marine

⁵⁷Ibid.

pollution, as well as developing a system for the registration of discharges and spillages at sea.⁵⁸

The 1970 Rome Conference of the Food and Agricultural Organization, which considered the effect of marine pollutants on living organisms, provided a successful model of the type of activity that leads to the collection of knowledge by an international group.

At the 22nd session of the United Nations General Assembly, Ambassador Arvid Pardo, Malta's Permanent Representative to the United Nations, suggested an addition to the agenda. He desired to take up the demilitarization of the ocean floor beyond the limits of existent jurisdiction and to internationalize the ocean's resources for all men. He suggested an international agreement that:

. . . should envisage the creation of an international agency to assume jurisdiction, as a trustee for all countries, over the present seabed and the ocean floor underlying the seas beyond the limits of present national jurisdiction. . . .⁵⁹

This concept was presented with the hopes it would prevent the exploitation and depletion of oceanic resources for the benefit of technologically advanced nations. Under pressure from several delegations the proposal was referred to the First Committee, the Political and Security Committee, rather

⁵⁸Ibid.

⁵⁹Daniel Cheever, "The Role of International Organization in Ocean Development," International Organization, XXII, 3 (Summer, 1968), p. 629.

than the Sixth Committee, the Legal Committee. An ad hoc committee was formed to find the means of promoting international co-operation with regard to the sea-bed.⁶⁰

The United Nations recently held a United Nations Conference on the Human Environment at Stockholm, Sweden. High hopes were held for this meeting, but little of substance seems to have been achieved. Politics played a large part in the proceedings.

The Agreement Concerning Pollution of the North Sea by Oil was formulated at a Bonn meeting in June of 1969 and came into force on August 9, 1969. Scandinavian and Western European States were parties to this agreement. The treaty was concluded under a directive from the IMCO emergency meeting convened after the Torrey Canyon disaster. This Conference encouraged further planning to meet future oil disasters when it encourages states to develop

. . . procedures whereby States, regionally or inter-regionally where applicable, can co-operate at short notice to provide manpower, supplies, equipment, and scientific advice to deal with discharge of oil or other noxious or hazardous substances including consideration of the possibility of petrols to ascertain the extent of the discharge and the manner of treating it both on sea and land.⁶¹

Article 4 of the treaty provided that contracting states would:

⁶⁰Ibid., p. 632.

⁶¹Belgium-Denmark-France-Federal Republic of Germany-Netherlands-Norway-Sweden-United Kingdom, "Agreement for Cooperating in Dealing with the North Sea by Oil," International Legal Materials, IX, 2 (March, 1970), p. 359.

. . .inform each other of their national organization for dealing with oil pollution; the authority designated within their state to receive reports of oil pollution and to offer assistance to other contracting parties; and new ways of avoiding and fighting oil pollution.

Articles 7 and 8 provide that signatories may call on each other for aid in oil pollution disasters and to submit reports to other contracting parties on steps taken to fight the pollution.

Efforts of Non-Governmental Groups

Following the Torrey Canyon wreck an agreement known as the Tanker Owners and Voluntary Agreement Concerning Liability for Oil Pollution (TOVALP) came into effect. It created the Contract Regarding an Interim Supplement to Tanker Liability for Oil Pollution (CRISTAL). CRISTAL is a voluntary mutual insurance syndicate, which went into effect on April 1, 1971. It is the only international compensation agreement that is operational. Governments alone may act against owners or charterers. Liability is based upon negligence of the tankers. Destruction of all property and cleanup expense are not covered, although government expense incurred in cleaning up private property are covered. Disputed claims are to be settled by conciliation and arbitration. Liability is limited to \$100 per gross ton, or \$10 million, whichever is smaller. The tanker owner is entitled to participate in the liability fund for

reasonable removal costs.⁶²

The admiralty lawyers of the maritime nations have formed the Belgium-based Comité Maritime Institute (C.M.I.). It largely represents the ship and cargo owners and their insurers. Following the Torrey Canyon wreck the C.M.I. set up an inquiry into the liability aspects of oil pollution. The chairman of the committee eventually recommended that absolute liability rests with the tanker owner.⁶³

The Views of Various Experts on the Role of International Organization in Dealing With Environmental Pollution

In analyzing the role that international organization can play in dealing with environmental pollution Professor Richard Gardner made the following statement to the American Society of International Law:

Almost everyone is now marching under the banner of environmental defense. The United Nations ought to be marching out in front, it is not. It joined the parade very late, after the parade had passed its door. Whether and how it can exercise any real leadership in this area is a question that concerns not only environmental specialists but also students of international law and organization . . .

A United Nations response to the environmental challenge is long overdue. While some measures to deal with the environment can be taken by individual nations, alone, there are resources that do not belong entirely to any nation--the sea, certain lakes and rivers, migratory animals--whose effective management requires

⁶²Swan, pp. 516-518 and 573.

⁶³Ibid., p. 518.

international co-operation.⁶⁴

Mr. Christian Herter Jr., in presenting his views on the United Nations actions in the environmental field, made the following points:

1. the U.N. has problems with the co-ordination of the work of the specialized agencies.
2. there is difficulty in the collection, retrieval, storage and dissemination of information.
3. co-ordination of research must be begun.
4. the United Nations should consider establishing a panel of environmental experts for giving technical assistance to developing nations.⁶⁵

Professor Richard Falk believes that the main uses of the oceans have historically been mutually compatible. He perceives that conflicts that developed in the past were settled by specific agreement or by the temporary deterioration of disputed resources. Further, he feels that the international law of the oceans accommodated basic needs by giving coastal states a measure of authority over offshore waters in order to protect their security and economic and health interests. He stated: "This regime of territorial seas constituted a compromise between sovereignty and community notions of control."⁶⁶

⁶⁴Richard W. Gardner, "Can the U.N. Lead the Environmental Parade," American Journal of International Law, LXIV, 4 (September, 1970), p. 211.

⁶⁵Ibid., pp. 216-217.

⁶⁶Richard Falk, "Toward Equilibrium in the World Order System," American Journal of International Law, LXIV, 4 (September, 1970), p. 222.

Falk believes these arrangements have come under pressure recently because: the technology of war has resulted in the expansion of oceanic control, technology has allowed advanced countries to operate successfully at great distances from their shores, and the value of mineral resources on the continental shelf has led states to claim this wealth for their own. These tendencies have led to the expansion of territorial sovereignty at the expense of the community regimes of shared use, according to Falk.⁶⁷

He concluded that a more active system of control is needed at the international level, because of the pressures placed on the international system by the interplay of technological development and the scale of human activity. These conditions are seen as making sovereignty and communal control ineffective to deal with present problems. Communal control is too permissive as a basis for governing ocean--and--space--based--activities; as a consequence, sovereign claims have been asserted to uphold special interests.⁶⁸

In focusing on the problems and possibilities involved in United Nations attempts to deal with environmental issues, Mr. Timothy Atkeson has made the following points:

⁶⁷Ibid.

⁶⁸Ibid.

1. Up to two-thirds of the U.N.'s members, mainly underdeveloped countries, do not see protection of the environment as a priority issue or one likely to lead to benefits to them.
2. Few U.N. members have had much experience with national, bilateral, or multilateral environment protection programs.
3. The U.N. has limited staff and budget capabilities in this area.⁶⁹

Mr. George Kennan believes that international environmental problems will have to be dealt with internationally in an effort, "much more urgent in its timing, bolder and more comprehensive in its conception and more vigorous in its execution than anything created or planned to date."⁷⁰

To deal with the problem Kennan believes adequate facilities are needed for the collection, storage, retrieval and dissemination of environmental information. He feels there is a need for the coordination of research and operational activities which deal with international environmental issues, the establishment of international standards, the development of regulatory organizations to force compliance with measures enacted, and a need for the establishment and enforcement of international rules not subject to national control.⁷¹ Essentially, Kennan is calling for preventive rather than remedial action.

⁶⁹Timothy Atkeson, "The U.N. and the Environment," American Journal of International Law, LXIV, 4 (September, 1970), pp. 226-227.

⁷⁰George Kennan, "To Prevent A World Wasteland," Foreign Affairs, XLVIII, 3 (April, 1970), p. 403.

⁷¹Ibid., pp. 404-405.

Mr. Kennan believes that an organizational personality is missing which would represent the interests of no group other than mankind as a whole at heart. Such an organization would have to be based on decisions made by true international servants dedicated to no national or political mandates. Hopefully, this organization could be formed by the leading industrial and maritime powers, the nations which are the major users of resources, as well as the major polluters.⁷²

The Recent Actions of Canada

Canada objected to the Torrey Canyon Conventions on the following grounds: they failed to give coastal States enough control to ensure that accidents would be prevented, liability was not placed on the cargo owner as well as the shipowner, and because compensations were made available only for damage caused on the high seas to fishing interests. For these reasons Canada undertook unilateral action to extend its control over the seas contiguous to its borders.⁷³

On April 17, 1970, Canada's Permanent United Nations Delegation announced in a letter to the United Nations that Canada was terminating its acceptance of the compulsory jurisdiction of the ICJ except in certain cases. It refused to accept arbitration in

⁷²Ibid., pp. 408-411.

⁷³Hardy, p. 328.

disputes arising out of or concerning jurisdiction or rights claimed or exercised by Canada in respect of the conservation, management, or exploitation of the living resources of the sea, or in respect of the preservation or control of pollution or contamination of the marine environment in marine areas adjacent to the coast of Canada.⁷⁴

As a result of her concern Canada formulated two new laws that may be dangerous precedents in the unilateral extension of jurisdiction over sea areas previously on the high seas.

Under the Arctic Waters Pollution Prevention Act, Canada drew a 100 mile zone outwardly from the Canadian islands in the Arctic and stated that within this zone she planned to exercise anti-pollution control enforced by regulations. In these areas Canada asserted the right to control all shipping and reserved the right to prohibit the free passage of vessels in these waters. In the event of pollution liability was, in most cases, to be absolute.⁷⁵

The second act, An Act to Amend the Territorial Sea and Fishing Zones, set up exclusive Canadian fisheries in areas on the high seas outside the 12 mile limit, as well as establishing a 12 mile territorial sea off the coast of Canada.⁷⁶

⁷⁴"Canadian Declaration Concerning the Comprehensive Jurisdiction of the International Court of Justice," International Legal Materials, IX, 3 (May, 1970), p. 599.

⁷⁵"Bill to Prevent Pollution of Arctic Water," International Legal Materials, IX, 3 (May, 1970), pp. 543-552.

⁷⁶"Bill to Extend Territorial Sea and Fishing Zone," Ibid., pp. 553-555.

On April 8, 1970, Canada's Prime Minister Trudeau commented on his Government's new legislation. He stated:

the position we take is that international law that now stands does not sufficiently protect countries on the pollution aspects of international waters. . . it is impossible for Canada to take forward steps in this area to help international law develop.⁷⁷

Further comments by Trudeau included:

where no law exists, or where law is clearly insufficient, there is no international common law, applying to the Arctic seas, we're saying somebody has to preserve this area for mankind until the international law develops . . .

The way international law exists now, it is definitely biased in favor of shipping in the high seas and in various parts of the globe, and in the past this has probably been to the benefit of the states of the world because there has been, because of this bias in international law, a great deal of development of commerce in all parts of the globe

I'm sure this action may accelerate the convening of international meetings by many nations to do multilaterally, by international law, what, as of now, we've had to do alone because nobody else can act in the Canadian Arctic if we don't.⁷⁸

The United States Department of State issued a statement concerning Canada's legislation which contained the following comments:

the enactment and implementation of these measures would affect the exercise by the United States and other countries of the right to freedom of the seas in large areas of the high seas and would adversely affect our efforts to reach international agreement on the use of the seas. . . .

⁷⁷"Canadian Prime Minister's Remarks on the Proposed Legislation," International Legal Materials, IX, 3 (May, 1970), pp. 600-604.

⁷⁸Ibid., pp. 601-604.

We are concerned that this action by Canada if not opposed by us, could be taken as precedent in other parts of the world for other unilateral infringements of the freedom of the seas.⁷⁹

Although Canada passed these tough new pollution laws, Representative William C. Cramer of Florida was quoted as saying that the Humble Oil and Refining Company, charterer of the tanker Delian Apollo that broke up off of Canada, "didn't accept the slightest responsibility, even after the president of the company was informed of what had happened."⁸⁰

Conclusion and Recommendations

The formation of a community consensus for the seas depends on the development of inclusive rather than exclusive claims. The idea of res nullius must be replaced with the concept of res communis. The law of the sea, such as it is, exists to protect the common interests of the world against the lawless. The existing law of the sea is in a fragile state, but without it a Darwinian struggle could well take place for control of the seas. Historically the settlement of controversies has been accomplished by unorganized, direct confrontation of the parties involved. There has been a failure of international law to deal with problems before they become chronic enough to demand settlement. The stan-

⁷⁹"U.S. Statement on Canada's Proposed Legislation," International Legal Materials, IX, 3 (May, 1970), p. 605.

⁸⁰Robert W. Deutsch, p. 11.

dards evolved by international sea law have taken many years to become established and are often incapable of adapting to face the demands of modern technology. International solutions to problems have lagged behind national laws developed to handle conflicts confronting the oceans. This is readily explainable by the fact that the officials of states have the coercive power of the state to support their actions, while international efforts are supported only to the degree that individual states are willing to allocate sovereign authority.

Marine pollution is probably the most pervasive of the problems facing international sea law. International law has failed to develop rules to deal adequately with Torrey Canyon situations. International law needs to establish and embody the idea that there is an international duty not to pollute. Presently some still maintain that there exists a freedom to pollute the seas. At a time when the ocean is slowly dying many supertankers continue their practice of casual oil pollution. Other reasons that current international law is inadequate to deal with existing oceanic pollution problems is because there are so many organizations working on the problem and because all aspects of the problem have not been defined.⁸¹

⁸¹Forest Griebes, "International Law and the Environmental Issue," Environmental Affairs, I, 4 (March, 1972), p. 828.

On the international level one school of thought, the "universalists," believe that the problems must be solved on a world-wide level, while another school, the "regionalists," stress a regional approach to the problem. However, the problem can probably successfully be approached by proceeding on both levels at once.⁸²

The Torrey Canyon incident had a positive effect on international law by pointing out areas of inadequacy. In the first place such disasters should be prevented from reoccurring. However, if they do occur the polluters should not be relieved of liability, and governments must be held accountable if they have proven negligent. The recent passage of the convention establishing an international compensation fund is a step in the right direction, as is the formulation of the Torrey Canyon Conventions.

If man is going to continue to transport, and if governments are going to persist in sanctioning this transport, legal machinery must be developed to govern it. The Torrey Canyon agreements represent another instance of international law responding to the chronic contemporary problem only after it has become flagrant. Sadly, even if these treaties had been in force at the time of the wreck they would not have prevented it, although they would have governed the events that occurred following it. What is

⁸²Ibid., pp. 830-831.

really needed is adequate preventive legislation. The technological achievements developed by man for coping with oil, coupled with his scientific knowledge of the effects of oil, are well documented. International legislative action could well implement this knowledge in the form of regulations to control oil pollution.

Unhappily the world is still composed of a family of bickering, untrusting nation-states. As one writer stated:

Man's technology has flagrantly outrun his administrative capacity. He cannot supervise the sea lanes of the world with an assortment of 120 or more petty, landbased authorities under loose, bickering agreements, and located higgledy-piggledy in every nation state. The hapless sea is dying because it is essentially res nullius, a thing belonging to no one. If it must wait for voluntary relief from the technological advances of a highly cutthroat industry, or from the hearty cooperation of envious nations whose actions are controlled by near-pirates, Neptune may as well walk his own plank.⁸³

Often conflicting domestic policies discourage the adoption of international policies. States must balance ecological interests against economic interests. All too often economic interests have won the battle. Many states continue to allow second-rate ships to register in their countries and thus fly their flag on the high seas. The Torrey Canyon was a flagship of the State of Liberia, one of several nations that make it relatively convenient for

⁸³Robert and Leona Rienow, p. 115.

shipowners to register their ships. Although many of Liberia's flagships are first-rate tankers, her procedure of investigation in the case of the Torrey Canyon raises severe doubts about the competence and quality of her registration program.

The question of a ship's flag state is crucial to the question of the oil pollution problems posed by super-tankers. On the high seas a ship's flag state has supremacy. These states have exclusive jurisdiction except in cases where they agree to yield to other jurisdiction. States can currently not punish alien ships which pollute areas outside their territorial waters. Until international law manages to deal adequately with oceanic oil pollution additional states will probably follow Canada's precedent of establishing non-pollution zones beyond the traditional zones of sovereignty.

Individual states can aid in the prevention of oil pollution incidents if they set up a regular patrol system to keep watch in strategic shipping areas. Many states currently rely on information on oil slicks from random sighting by ships and planes. Often such sightings are made long after an offending ship has left an area. The addition of minute, yet unique mixtures of radioactive substances to the oil cargoes of tankers, is a simple, but effective step that would aid in the location and identification of tankers that make large-scale spills.

Nation-states could be allowed to treat oil-polluters as they have dealt with pirates. All states have the right to deal with pirates on the high seas. This right could be extended to the handling of polluters caught in international waters. Under present conditions, however, this might lead to personal vendettas and "tuna-boat" type wars over polluting incidents.

Several measures could be codified by national, and/or international agreement in the field of prevention. Future tankers could be forced to have stronger and smaller compartments for cargo. Epoxy coating of tanks could minimize the oil left after cleaning. Also, the size of tankers could be limited by international agreements.⁸⁴ A convention dealing with better equipment and technological devices could help prevent Torrey Canyon polluting incidents. Above and beyond additional national and international legislation a convention is needed to empower an international tribunal with a degree of police authority.

Any move toward international control must be based on specific proposals backed up by detail. There is presently strong opposition to any move toward international control of the oceans by the United Nations or any other body. Under existing legal framework the use of the oceans and the exploitation of their resources is competitive with

⁸⁴Nanda, p. 420.

the chief benefits going to the wealthier, technologically superior states.

Member states of the world community continue to conduct their foreign relations and international operations, such as foreign aid and ocean research, on a bilateral or unilateral basis. Only when permanent members agree may the Security Council undertake enforcement action or impose economic sanctions binding on all governments. The major powers are reluctant to see powerful, autonomous bodies undertake effective regulatory measures. International organization is presently too weak administratively and governmentally to manage the sea. How can international organization be stronger in the sea than it has been on the land? How can the wants and needs of small vs. large nations be adjudicated?

A step in the ability of international organizations to deal with the marine problem could be made if the role of the Intergovernmental Maritime Consultative Organization were expanded. It could be given enforcement authority to hear oil pollution complaints. Such a body would be the ideal place to conduct hearings similar to the one Liberia held on the Torrey Canyon. It could also be structured to deal with flagrant violators of anti-dumping legislation. IMCO could be given the power to supervise and inspect a ship's navigation equipment, administer international licensing of tanker officers, and provide training in handling super-

tankers. This same body could further set up well-defined routes and mandatory sea lanes for tankers. Possibly IMCO could develop and maintain several oil pollution emergency stations in the area of the world's busiest sea lanes. If such forces were mobile and staffed with modern pollution fighting equipment and machinery, competent scientists, and an adequate fleet, they could attenuate the consequences oil polluting incidents.

It would be encouraging to report that the lessons of the Torrey Canyon had been learned. Today, however, the increasing numbers of supertankers on the high seas are essentially governed by the same laws in existence before the wreck of the Torrey Canyon. The major advances in oil pollution legislation have been enacted by individual states. As yet the international oil pollution legislation enacted following the Torrey Canyon incident has not yet entered into force. For the time being enforcement will have to rest with internationally accepted agreements, the municipal laws of the state system, and corporate agreements.

Unhappily the "energy crisis" in major nations, such as the United States, may mean that the need for oil will override the ecological requirements of the sea. Undoubtedly the major states are going to need more oil in the future. Most of these states will have to utilize the supertanker because of their inadequate national oil reserves. It remains to be seen if an increased reliance on the supertanker

will result in increased pollution.

Possibly the challenge of the oceans will so exceed the current abilities of the individual state that powerful integrated world institutions will become acceptable. Hopefully, sovereign claims will yield to the rights of the world at large and provide the machinery to legislate, regulate, and police the oceans effectively. There is little time left for debate!

BIBLIOGRAPHY

Books

- Booker, Frank; Gill, Crispin; Soper, Tony. The Wreck of the Torrey Canyon. Devon, England: David and Charles Limited, 1967.
- Brown, Tom. Oil On Ice. San Francisco: Sierra Club, 1971.
- Burgess, Frederick J., and Olson, Theodore A., ed. Pollution and Marine Ecology. New York, London, Sydney: John Wiley and Sons, 1967.
- Burke, William, and McDougal, Myres. The Public Order of the Oceans. New Haven and London: Yale University Press, 1962.
- Colombos, John. The International Law of the Sea. London: Longman's Inc., 1961.
- Cooke, R. F. "Oil Transportation by Sea." Oil on the Sea. Edited by David Hoult. New York: Plenum Press, 1967.
- Cowan, Edward. Oil and Water. Philadelphia and New York: J. B. Lippincott, 1968.
- Davison, Charles. The Freedom of the Seas. New York: Moffat Yard and Co., 1918.
- Dorst, Jean. Before Nature Dies. Baltimore: Penguin Books, 1971.
- Engler, Robert. The Politics of Oil. New York: MacMillan Company, 1961.
- Gray, Earle. Impact of Oil. Toronto, Winnipeg, and Vancouver: Ryerson Press, 1969.
- Heyerdahl, Thor. The Ra Expedition. Garden City, New York: Doubleday and Co. Inc., 1970.

- Jessup, Philip. The Law of the Territorial Waters and Marine Jurisdiction. New York: G. A. Jennings Co., 1927.
- Kormondy, Edward J. Concepts of Ecology. Englewood Cliffs, N. J.: Prentice Hall Inc., 1969.
- Marx, Wesley. The Frail Ocean. New York: Ballantine Books, 1967.
- Odell, Peter. Oil and World Power. Harmondsworth, England: Penguin Books, 1970.
- Potter, Pittman. The Freedom of the Seas in History, Law, and Politics. London: Longman's Inc., 1929.
- Ridgeway, James. The Politics of Ecology. New York: E. P. Dutton and Co. Inc., 1970.
- Smith, J. E. ed. Torrey Canyon Pollution and Marine Life. Cambridge: Cambridge University Press, 1968.
- Von Glahn, Gerhard. Law Among Nations. London: Collier McMillan, 1965.
- Wagner, Richard H. Environment and Man. New York: W. W. Norton and Co. Inc., 1971.

Articles and Newspapers

- Atkeson, Timothy. "The U. N. and the Environment," American Journal of International Law, LXIV, 4 (September, 1970), pp. 403-413.
- Beynon, Ray, and Brockis, Graham. "Keeping Coasts Clean," New Scientist, XXXVII, 581 (January, 1968), pp. 196-197.
- Brown, E. D. "International Law and Marine Pollution: Radioactive Wastes and 'Other Hazardous Substances'," Natural Resources Journal, XI, 2 (April, 1971), pp. 221-248.
- Business Week. March 8, 1969; August 7, 1971; and May 20, 1972.

- Cheever, Daniel. "The Role of International in Ocean Development," International Organization, XXIII, 3 (Summer, 1968), pp. 629-648.
- Croome, Angela. "Oil from the Torrey Canyon," Sea Frontiers, XIV (May-June, 1968), pp. 138-149.
- Dean, Arthur H. "The Second Conference on the Law of the Sea," American Journal of International Law, LIV, 4 (October, 1960), p. 751.
- Deutsch, Robert W. "Oil On The Water," The New Republic, February 28, 1970, pp. 10-11.
- Eichelberger, Clark M. "The U. N. and the Sea," Saturday Review, October 14, 1967, pp. 22 and 114.
- Falk, Richard. "Toward Equilibrium in the World Order System," American Journal of International Law, LXIV, 4 (September, 1970), pp. 217-224.
- Fisher, James and Charton, Seline. "A Tragedy of Errors," Audobon, LXIV (November, 1969), pp. 72-85.
- Friedman, Wolfgang. "Selden Redivivus--Towards a Partition of the Seas," American Journal of International Law, LXV, 5 (October, 1971), pp. 757-770.
- Gardner, Richard W. "Can the U. N. Lead the Environmental Parade," American Journal of International Law, LXIV, 4 (September, 1970), pp. 211-214.
- Graber, Michael. "The Great Ocean Sweepstakes," Sea Frontiers, XVII, 146 (May-June, 1971), pp. 145-159.
- Grieves, Forest. "International Law and the Environmental Issue," Environmental Affairs, I, 4 (March, 1972), pp. 826-836.
- Hardy, Michael. "International Control of Marine Pollution," Natural Resources Journal, XI, 2 (January, 1971), pp. 296-348.
- Hovansen, Archie J. "Post Torrey Canyon: Toward a New Solution to the Problem of Traumatic Oil Spillage," Connecticut Law Review, II, 2 (Spring, 1970), pp. 632-647.

"International Maritime Consultative Organization,"
International Organization, XX, 4 (Autumn, 1966),
pp. 832-834.

Jessup, Philip. "The Geneva Conference on the Law of the
Sea--A Study in International Lawmaking,"
American Journal of International Law, LII, 4
(October, 1958), pp. 73-733.

Kennan, George. "To Prevent A World Wasteland," Foreign
Affairs, XLVIII, 3 (April, 1970), pp. 401-413.

"Law of the Sea," American Journal of International Law,
LXIV, 5 (October, 1970), pp. 1021-1023.

McCaul1, Julian. "Black Tide," Environment, X, 9
(November, 1969), pp. 2-16.

McGurren, Henry J. "The Externalities Of A Torrey Canyon
Situation: An Impetus For Change in Legislation,"
Natural Resources Journal, XI, 2 (April, 1971),
pp. 349-372.

Nanda, Ved P. "The Torrey Canyon Disaster," Denver Law
Journal, XLIV, 3 (Spring, 1971), pp. 400-425.

New Republic. April 29, 1967.

Newsweek. April 3, April 10, 1967; October 19, 1970.

New Yorker. April 29, 1967.

"Oil Pollution On The Sea," Harvard International Law
Journal, X, 2 (Spring, 1969), pp. 316-359.

Pilpel, N. "The Natural Fate of Oil on the Sea," Endeavor,
January, 1969, pp. 11-13.

Potts, Geoffrey. "Unwanted Oil," Sea Frontiers, XIV, 4
(July-August, 1968), pp. 221-233.

Rienow, Robert. "Manifesto for the Sea," American
Behavioral Scientist, XI, 6 (July, 1968), pp. 33-
37.

Schacter, Oscar and Serwer, Daniel. "Marine Pollution--
Problems and Remedies," American Journal of
International Law, LXV, I (January, 1971),
pp. 84-112.

Solomon, Stephen. "Somebody Fouled Up," New Republic, October 31, 1970, pp. 21-23.

Swan, Peter N. "International and National Approaches to Oil Pollution Responsibility: An Emergency Regime for a Global Problem," Oregon Law Review, L, 3 (Spring, 1971), pp. 509-586.

The Times [London]. March, April, May, July, 1967; February, 1968; November, 1969.

Time. November 21, 1967; December 26, 1969; March 29, 1971; and September 18, 1972.

U. S. News and World Report. April 10, 1967; February 8, 1971.

Wierzynski, Gregory H. "Tankers Move the Oil That Moves the World," Fortune, September 1, 1967, pp. 80-85 and 151-152.

Public Documents

Belgium-Denmark-France-Federal Republic of Germany-Netherlands-Norway-Sweden-United Kingdom.
"Agreement for Cooperating in Dealing with the North Sea by Oil," International Legal Materials, IX, 2 (March, 1970), pp. 359-365.

"Bill to Extend Territorial Sea and Fishing Zone," International Legal Materials, IX, 3 (May, 1970), pp. 553-555.

"Bill to Prevent Pollution of Arctic Water," International Legal Materials, IX, 3 (May, 1970), pp. 543-552.

"Canadian Declaration Concerning the Comprehensive Jurisdiction of the International Court of Justice," International Legal Materials, IX, 3 (May, 1970), pp. 598-599.

"Canadian Prime Minister's Remarks on the Proposed Legislation," International Legal Materials, IX, 3 (May, 1970), pp. 600-604.

"Convention on Fishing and Conservation of the Living Resources of the High Seas," American Journal of International Law, LII, 4 (October, 1958), pp. 851-858.

"Convention on the Continental Shelf," American Journal of International Law, LII, 4 (October, 1958), pp. 858-862.

"Convention on the High Seas," American Journal of International Law, LII (October, 1958), pp. 842-851.

"Convention on the Territorial Sea and the Contiguous Zone," American Journal of International Law, LII, 4 (October, 1958), pp. 834-842.

"International Convention on Civil Liability for Oil Pollution," American Journal of International Law, LXIV, 2 (April, 1970), pp. 481-490.

"International Convention on the Establishment of an International Fund for Compensation for Oil Pollution Damage," American Journal of International Law, LXVI, 3 (July, 1972), pp. 712-733.

"International Convention Relating to Intervention on the High Seas in Cases of Oil Pollution Casualties," American Journal of International Law, LXIV, 2 (April, 1970), pp. 471-480.

National Legislation and Treaties Relating to the Territorial Sea, The Contiguous Zone, The Continental Shelf, The High Seas and to Fishing and Conservation of the Living Resources of the Sea. United Nations: New York, 1970.

"Optional Protocol of Signature Concerning the Compulsory Settlement of Disputes," American Journal of International Law, LII, 4 (October, 1958), pp. 862-864.

"Remarks by U. K. Attorney General on Torrey Canyon Settlement," International Legal Materials, IX, 3 (May, 1970), pp. 633-635.

Report of the Committee of Scientists on the Scientific and Technological Aspects of the Torrey Canyon Disaster. The Torrey Canyon. London: Her Majesty's Stationery Office, 1967.

"Resolution adopted by the Conference on establishment of an international compensation fund for oil pollution damage. United Nations Juridical Yearbook, 1969, p. 181.

"United Nations: Treaty on Prohibiting the Emplacement of Nuclear Weapons on the Seabed and Ocean Floor," International Legal Materials, X, 1 (January, 1971), pp. 145-152.

United Nations. Treaty Series. Treaties and International Agreements Registered or Filed and Reported with the Secretariat of the United Nations. CCLXXXIX (1958), 4215, "Convention on the Intergovernmental Maritime Consultative Organizations," March, 1958.

United Nations. Treaty Series. Treaties and International Agreements Registered or Filed and Reported with the Secretariat of the United Nations. CCLXXXIX (1958), 4214, "Final Act of the United Nations Maritime Conference (with annexes)," March, 1948.

United Nations. Treaty Series. Treaties and International Agreements Registered or Filed and Reported with the Secretariat of the United Nations. CCCXXVII (1959), 4714, "International Convention for the Prevention of Pollution of the Sea by Oil, 1954," May 12, 1954.

"U. S. Settlement on Canada's Proposed Legislation," International Legal Materials, IX, 3 (May, 1970), pp. 605-606.